



TEAM BASED LEARNING

COLLABORATIVE



Planet Hollywood
Las Vegas, Nevada
March 2-4, 2011

10th Annual TBLC Meeting

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Meeting Program

Wednesday, March 2, 2011

Pre-Conference Workshops

(separate registration required)

8:30 - 1:00	Registration Desk Open	Celebrity Ballroom
9:00 - 12:00	TBL 101	Celebrity 6
1:00 - 4:00	Creating Modules	Celebrity 6

Thursday, March 3, 2011

7:30 - 3:00	Registration Desk Open	Celebrity Ballroom
8:00 - 8:15	Introduction & Welcome Michele Clark, 2011 Program Chair Ruth Levine, President TBLC	Celebrity 6
8:15 - 9:15	Plenary Session 1 <i>Researching Team Based Learning</i> Paul Haidet	Celebrity 6
9:15 - 10:45	Oral Presentations Session 1 <i>New Research in Team Based Learning</i> Moderator: Charles Seidel	Celebrity 6
10:45 - 11:00	Break	
11:00 - 12:30	Workshop Session 1	
	I: How to create and use TBL Application activities for analyzing authoritative sources in humanities and social science	Celebrity 6
	I: Ways to Incorporate Technologies into TBL Experiences	Wilshire A
	R: Turning Teaching into Scholarship	Wilshire B
	F: Writing Multiple Choice Questions that Match your Objectives	Sunset 5
12:30- 1:30	Lunch	Celebrity 7

Meeting Program

1:30 - 2:30	Poster & Exhibitor Viewing	Celebrity 6
2:30 - 4:00	Workshop 2	
	I: Build Team Efficacy into your TBL Course	Celebrity 6
	I: Get your TBL Course on line	Wilshire A
	I: Intro of TBL into the Quantitative Subjects	Wilshire B
	R: Fundamental Statistics in Educational Research	Sunset 5
6:00	Conference Dinner	Celebrity 7

Friday March 4, 2011

7:30 - 1:00	Registration Desk Open	Celebrity Ballroom
8:00 - 10:00	Workshop Session 3	
	I: Effective TBL Application in the Social Sciences and Humanities	Wilshire B
	I: TBL in the Engineering Classroom	Sunset 6
	I: Taking TBL to an Online Hybrid Using Elluminate	Sunset 5
	R: Measuring Educational Outcomes	Celebrity 6
	F: Improving Feedback and Individual Accountability in Peer Evaluations	Wilshire A
10:00 - 11:00	Poster/Exhibitor Presentation	Celebrity 6
11:00 -12:-15	Oral Presentations - Session 2 <i>Innovations in Team Based Learning</i> Moderator: Michael Sweet	Celebrity 6
12:15 - 1:15	Lunch - Business Meeting	Celebrity 7
1:15 - 2:15	Plenary Session 2 <i>Simultaneous Report, Let Me Count the Ways</i> Larry Michaelsen	Celebrity 7

Oral Presentations Session 1

New Research in Team Based Learning

Moderator: Charles Seidel

Assessing Team-Based Learning and Web-Based Education in Primary Care Clerkships

Jennifer M. Purcell

Psychometric Analysis of a New Team-Based Learning Instrument

Heidi Ann Mennenga

Taking a Team Shelf Exam: Do "Better" Teams do Better?

Ruth E. Levine

A Team-Based Learning Interprofessional Quality Improvement and Patient Safety Curriculum

Paul Haidet

An Assessment of Outcomes from a Modification to the Readiness Assurance Process of Team Based Learning

Janil Puthuchery

ABSTRACTS

Assessing Team-based Learning and Web-based Education in Primary Care Clerkships

Jennifer M. Purcell, PhD, Deborah Jones, MD, MPH, Sharon Krackov, EdD, Pablo Joo, MD, Albert Einstein College of Medicine, Columbia University College of Physicians and Surgeons, Associated Medical Schools of New York

The impact of team-based learning (TBL) on examination performance when used in combination with web-based instruction during a clerkship has not been studied. As part of our initiative, the primary care clerkships at two medical schools use a joint web-based delivery system to teach five core content areas and employ a common 100-item exam bank to measure student performance. In addition, one school has implemented a TBL curriculum to apply concepts in four of the five content

areas. Exam scores for all five content areas, using one as a baseline, will be compared across the two schools. Our findings will be of interest to educators in any discipline who are considering the introduction of TBL and/or web-based instruction to their curriculum.

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Development and Psychometric Analysis of a New Team-Based Learning Instrument

Heidi Ann Mennenga, PhD, RN

Aim: This paper is a report of the development and psychometric testing of the "Team-Based Learning Student Assessment Instrument."

Background: Team-based learning is an innovative teaching strategy which offers educators a structured, student-centered learning environment (Fink & Parmelee, 2008). Although research related to team-based learning has been conducted in a variety of disciplines, a major barrier to researchers is the lack of available instruments for team-based learning.

Method: Instrument development consisted of concept clarification, item development, and psychometric testing. The initial 45 items were developed based on a review of the literature. Four content experts established a content validity index of 0.85. Based on comments from the experts and the content validity index, the instrument was reduced to 39 items.

Results: Data was collected from 396 nursing students at one southwestern university who were taking a course using team-based learning. Principal axis factoring using varimax rotation was conducted on each of the three subscale as well as the total instrument. Psychometric testing resulted in a revised 33-item instrument that demonstrated an overall Cronbach's alpha of 0.94. The three subscales yielded Cronbach's alphas between 0.78 and 0.94.

Conclusions: Results indicated that the newly developed "Team-Based Learning Student Assessment Instrument" did accurately measure the three subscales. Based on the factor analysis, six items were eliminated, creating a final 33-item instrument. The results of the psychometric testing of this instrument suggest it to be a valid and reliable tool.

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Taking a Team Shelf Exam: Do “Better” Teams do Better?

Ruth E. Levine¹, Agata Butler², Lisa Carchedi³, Sandy Cook⁴, Paul Haidet⁵, Brenda Roman⁶, David Swanson², Mark Townsend⁷, Britta Thompson⁸, ¹The University of Texas Medical Branch, Galveston, ²National Board of Medical Examiners ³Southwestern Medical Center, Austin, ⁴Duke-NUS Graduate Medical School Singapore. ⁵Pennsylvania State University College of Medicine, ⁶Wright State University, Boonshoft School of Medicine, ⁷Louisiana State University Health Science Center, ⁸University of Oklahoma Health Science Center

Background: Team work skills are increasingly being recognized as an essential competency in health sciences education. Team based learning (TBL) is valuable for enhancing teamwork skills because it emphasizes individual and group accountability. High quality team interactions, such as trust, cohesiveness, and positive communications, are thought to be important components contributing to the effectiveness of TBL. Nevertheless, little research has tested the hypothesis that the quality of team cohesiveness is correlated to team performance.

Purpose: To determine if there is a relationship between team functioning and team performance on a standardized national exam in psychiatry.

Methods: A high stakes team exam using the National Board of Medical Examiners (NBME) Psychiatry Shelf exam was administered to 3rd years Psychiatry students at 3 schools (The University of Texas Medical Branch, Louisiana State Health Science Center, and Wright State University Boonshoft School of Medicine). All students also complete the Team Emotional Awareness and Management Scale (TEAMS)¹ (a 16-item self-administered survey about teamwork and emotions) at the beginning of their 6 week clerkship and immediately after they were put into TBL teams. They took it again along with the Team Performance Scale (TPS)¹ survey (an 18-item self administered survey regarding each student's attitudes about his/her team) at the end of the clerkship. Students took the individual NBME subject test as part of their clerkship grade. After a short break, they took the same test using their “TBL” teams of 5-7 students. Scores on the Team shelf exam were correlated with scores on the TPS and the TEAMS to determine the relationship between students' perceptions of team functioning and actual team performance.

Results: Preliminary results indicated that the teams scored extremely high on the team test. The majority of students felt that 1) having the NBME test on their grade feels appropriate, 2) their TBL team worked well together while taking their team test, and 3) they paid more atten-

tion to getting their TBL team to function well during the clerkship than they would have if the NBME team test were not part of their clerkship grade.

Conclusions: Incorporating a high stakes team test seemed to motivate students to focus on team functioning. Further data is needed to see if more cohesive teams performed better on high stakes team tests.

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A Team-Based Learning Interprofessional Quality Improvement and Patient Safety Curriculum

Paul Haidet MD MPH, Mary Beth Clark RN EdD, Chengwu Yang MD PhD, Cori Breault MEd, Helen Chen MS, Robert Cherry MD., The Pennsylvania State University, Hershey, Pennsylvania.

Purpose: Nurses and physicians share responsibility for improving quality and safety in healthcare systems, arguing for shared learning about these concepts.

Methods: We created an 8-hour interprofessional curriculum for the first-year medical (n=145) and senior nursing student class (n=51) at the Penn State-Hershey campus. We used Team-Based Learning (TBL), a method that employs learning teams to foster engagement and application of concepts. Half of our learning teams contained medical and nursing students; the other half were medical-only. Using validated tools, we measured student attitudes about course content and interprofessional learning, self assessment of knowledge, the value of teamwork, and achievement of course objectives. For all comparisons, we used t-tests for parametric data and wilcoxon rank-sum tests for non-parametric data.

Results: 185 students (94%) completed pre- and post-surveys. Students rated the workshops favorably on achieving content (mean ratings 4.4-5.6 on a 7-point scale, SD 0.9-1.4) and interprofessional (means 5.2-5.6, SD 1.1-1.5) objectives. Nursing students reported more favorable attitudes toward dealing with medical errors and addressing systems issues, and placed more value on interprofessional learning than medical students (all p values <0.05). Medical students placed more value on individual judgment (p<0.001). At the end of the course, several of these differences were reduced in the interprofessional learning teams, compared to the medical-only teams. There were no differences in self-assessments of knowledge.

Conclusions: Even at this early stage, important attitude differences exist between medical and nursing students. TBL may help to mitigate these differences by providing opportunities for students to work together to solve quality improvement problems.

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An Assessment of Outcomes from a Modification to the Readiness Assurance Process of Team Based Learning

Janil Puthuchearu MRCPCH, Goh Sok Hong MSc, Doyle Graham MD, Sandy Cook PhD Duke-NUS Graduate Medical School, Singapore

Background: Our institution delivers almost all instruction in the first year of medical school through Team Based Learning. In one 20 week course (with a total of 40 Readiness Assurance Process (RAP) sessions) covering Pathology, Pharmacology, Immunology and Microbiology, the structure and delivery of the RAP was modified. Modifications include the introduction of a limited number (2 per 25) of questions students could choose to do as open book in the Team RAP, and a Student driven discussion following the Team RAP. Modifications were made with the intent to increase the amount and depth of discussion around the questions and concepts. In addition, we wanted our students to begin to address issues of certainty, confidence and the relevant source material. We have previously reported an increase in student and faculty satisfaction with the modified approach. We are now interested in assessing if the modifications and the resulting group choice (open vs closed book), and group performance (correct vs incorrect) affected individual retention of knowledge.

Description: We chose 13 questions from a single subject (Immunology) that represented a spectrum of group choices and outcomes when the class of 56 MS1 students had initially received the RAP. This is to include those that were done open book and closed, as well as those where the group got the item correct the first time, and those where the group got it wrong. These questions were repeated at the end of a 20-week course, with no extra instruction on these topics during the gap. The students were not aware that the questions would be repeated. The differences between the students' individual scores from the 2 sittings were compared on the basis of the choice and performance of their group at the first sitting.

Results: The overall average individual scores increased significantly from 35% correct at first sitting to 48% correct for second sitting, ($p < .001$). When the scores were analysed on the basis of the group

choice and group performance there were some interesting findings. When the group chose "Open Book" – the individual mean at the first sitting was 30% and increased to a mean of 54% at the second sitting ($p < .001$). When the group chose to do the question "Closed Book" and the group got it correct, the individual mean scores were 59% and decreased slightly at the second individual sitting to 51% ($p = NS$). However, when the group chose "Closed Book" and got the question wrong after the first individual attempt, the scores increased significantly (16% for first individual sitting, to 40% correct for second sitting, $p < .001$).

Conclusion: General literature suggests that performance drops after time with no reinforcement of concepts. That was illustrated by the slight decline in our individual student performance on the Closed Book option when the group got it correct and did not discuss further. But in every other situation which involved group discussion or reinforcement, either open or closed book, the average INDIVIDUAL performance significantly increased at the repeat assessment. This increase was particularly impressive, when the individual student got it wrong AND the team got it wrong. Thus, the data suggest that the TBL process as a whole leads to an increase in retention.

Workshop Session I

INNOVATIONS TRACK

How to create and use TBL Application activities for analyzing authoritative sources in humanities and social science

Joel Dubois

Ways to Incorporate Technologies into TBL Experiences

Michael Robinson, Nancy Bauer, Jenifer Cannon and Charles Seidel

RESEARCH TRACK

Turning Teaching into Scholarship

Wayne McCormack

FUNDAMENTALS TRACK

Writing Outstanding Multiple Choice Questions that Match your Objectives

Sandy Cook and Ruth Levine

ABSTRACTS

Using TBL Application Activities for Analyzing Authoritative Sources in Humanities & Social Science Courses

Joel Dubois

As documented in Michaelson et al. (2002, 2007, 2008), TBL has been broadly applied to disciplines such as business, clinical practice, and engineering, which address commonly recognized and widely appreciated practical issues. The method is only now starting to be widely applied to humanities & social science disciplines, which have as their central focus the less widely valued meta-cognitive analysis of authoritative sources. As suggested by Gail (2002), the analytical thinking promoted by such disciplines require designing distinctive application activities.

Drawing on my own experience of applying TBL to my courses of the

past six years, I will engage participants in completing a sample team assignment analyzing written text, still images and audio-visual sources. Along the way, and especially in the discussion triggered by the simultaneous reporting of teams, I will spotlight features that make such assignments especially effective.

Ways to Incorporate Technology in your TBL Exercises

Michael Robinson, PhD, Nancy Bauer, MS, Jenifer Cannon, MD, Charles Seidel, PhD, Ross University School of Medicine, Freeport, Grand Bahama, The Bahamas

Two essential components of Team Based Learning are the Readiness Assessment Test (iRAT/gRAT), and the Group Application activity. With advancements in classroom technology it is tempting to introduce this technology into the RAT process. Likewise, during the Group Application portion of TBL, there are a number of ways to introduce technology to increase realism and engagement by students. The facilitators of this workshop are using TBL as an educational approach to train preclinical medical students. They have experimented with different technologies and will share their experience incorporating whole-body simulators, WebSP, and audience response systems into RAT and group application activities. These technologies, their incorporation into TBL, student and faculty feedback on their use, as well as benefits and short-comings, will be briefly discussed. During the session participants will be asked to share their experiences utilizing high or low tech activities in their own TBL experience.

The workshop goal is for all to depart this session with new ideas on how to optimally construct TBL sessions using technology such that the educational process drives the technology rather than the reverse.

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Turning Teaching Into Scholarship

Wayne T. McCormack, Ph.D., University of Florida College of Medicine

Teaching is an important part of any faculty member's job assignment, and being an effective teacher can greatly influence promotion and/or tenure decisions. Taking a scholarly approach to teaching takes teaching to a "higher level". Although most faculty members involved in research activities can describe research scholarship and how to assess it,

describing educational scholarship and how to assess it can be challenging.

Writing Outstanding Multiple Choice Questions that Match Your Objectives

Sandy Cook Ph.D. and Ruth Levine M.D.

Introduction:

Team-Based Learning (TBL) requires careful mapping of the content and assessments. Instructors need to clearly identify what they want their students to be able to do, craft learning resources and activities to guide the students, and develop assessments to determine if the students have achieved the desired outcome. Thus, the ability to formulate clear objectives and write quality multiple choice questions are critical skills for all instructors, but is particularly important for faculty who are intent on creating TBL activities. The purpose of this workshop is to introduce the participants to key principles of writing good objectives and MCQs.

Resources: Please read: Writing Outstanding MCQs that Match Your Objectives: Why Keep Assessing

Your Student's Performance a Secret? Article located on website

Objectives: From reading the article and by the time of the workshop the participants should be prepared to:

1. Define the elements of a good "higher order" objective.
2. Explain the purpose of a well-written objective.
3. Identify the most common flaws in poorly written MCQs.
4. Appreciate the difficulty and value of writing good MCQs.

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Workshop Session 2

INNOVATIONS TRACK

Build Team Efficacy into your TBL Course

Karla Kubitz

Get your TBL Course on line: Power the Virtual

Marcia Dixon

Introduction of TBL into the Quantitative Subjects

Judy Paterson

RESEARCH TRACK

Fundamental Statistics in Educational Research

Cyndi Garvan

ABSTRACTS

Building Team Efficacy in Team-based Learning

Karla Kubitz, Ph.D., Towson University, Towson, MD

Bandura (1986; 1997), in an extension of his self-efficacy theory of motivation, proposed the construct, team efficacy. Team efficacy is a team's shared belief in its ability to organize and carry out the actions required to achieve team goals. Team efficacy is influenced by past performance accomplishments, verbal persuasion, group size, and the length of time that a team has been together. Team efficacy is important in team-based learning because it influences team effort / performance. It is also related to team cohesion as well as to individual motivation and affect. Team efficacy can be enhanced by a variety of strategies, including several that are 'standard' in team-based learning classes. Some of these include defining success in mastery terms, controlling group size, establishing a mastery climate, team goal setting, adapting the team task, using simulations, encouraging positive team talk, monitoring/ changing team attributions, and building team cohesion.

Using Team-Based Learning in Online Courses: Making Virtual Connections

Marcia D. Dixon, Associate Professor and Chair of Communication, Indiana-Purdue at Fort Wayne

Team-based learning is recognized as an effective means of engaging students with content and with each other. This is especially important in online courses where research shows one of the challenges is students feeling isolated (Lewis & Abdul-Hamid, 2006; Ortiz-Rodriguez, et. al, 2005; Russo & Campbell, 2004; Song & Singleton, 2004). Applying team based learning principles to the online environment, while both easier and more challenging than the traditional classroom, provides an effective method for getting students engaged with the course and interacting with each other.

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Introduction of TBL into Qualitative Subjects

Dr Judy Paterson and Dr Jamie Sneddon, Department of Mathematics, Auckland University, New Zealand. Dr Rachel Fewster, Department of Statistics, Auckland University, New Zealand. Graham Foster, Department of Physics, Auckland University, New Zealand

In 2010 we decided to implement TBL in a third year mathematics course. A question posted on the web about using TBL in the mathematical sciences revealed that very few people are using it.

There are a number of hurdles involved in introducing TBL into the mathematical sciences: The content is very densely packed and often highly symbolic, perceived as difficult for students to access without support. How can you ask students to read to prepare for the IRATs?

In addition, the vital roles communication between students and informal argument play in the learning process in this field are not universally recognized. This is strange since the manner in which collaborative researchers behave often closely resembles the behavior exhibited as teams argue and collaborate during TRATs and tasks.

We have worked at introducing TBL in maths, maths education, statistics and physics.

Fundamental Statistics in Educational Research

Wayne T. McCormack, Ph.D. & Cynthia W. Garvan, Ph.D. University of Florida, Gainesville, FL

The focus of team-based learning (TBL) on problem-solving and integration of information has tremendous potential but has not been widely explored for improving biomedical science graduate education or post-doctoral training. TBL was implemented in a responsible conduct of research (RCR) course for biomedical science graduate students, which was also attended by a small number of postdoctoral fellows. The TBL experience was assessed by retrospective comparison of learner course evaluations.

Workshop Session 3

INNOVATIONS TRACK

Effective TBL Application in the Social Sciences and Humanities
Sophie Sparrow and Margaret McCabe

Team-based Learning in the Engineering Classroom: What We Have Learned Along the Way
Peter Ostafichuk and James Sibley

Taking TBL to an Online Hybrid Using Elluminate – Soup to Nuts
Mike Welker

RESEARCH TRACK

Measuring Educational Outcomes: A Critical Activity
Britta Thompson

FUNDAMENTALS TRACK

Improving Feedback and Individual Accountability in Peer Evaluations
Derek Lane and Paul Koles

ABSTRACTS

Effective TBL Application in the Social Sciences and Humanities

Sophie Sparrow, JD, Professor of Law, University of New Hampshire School of Law, (formerly Franklin Pierce Law Center), Concord, NH, Margaret Sova McCabe, JD, Professor of Law, University of New Hampshire School of Law, (formerly Franklin Pierce Law Center), Concord, NH

In TBL courses, students spend most of their time engaging in sophisticated applications where they work in teams to solve complex problems. Many teachers who use TBL understand **what** effective applications should do and **why** applications help students learn. But teachers strug-

gle with **how** to develop appropriate and effective applications for their courses. In this workshop, participants will engage in the "nuts and bolts" of designing applications and assessing their effectiveness. As workshop facilitators, we will share methods and approaches that have worked for our classes and engage teams in learning from and helping each other develop applications.

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Team-Based Learning in the engineering classroom: What we have learned along the way

Peter Ostafichuk, Antony Hodgson, and James Sibley, the University of British Columbia

TBL has been a part of courses in the Department of Mechanical Engineering at the University of British Columbia since 2004. We have delivered a large number of courses using TBL, ranging from undergraduate to graduate, and from small classroom to large, tiered lecture theatres. In this session we will highlight some of the enhancements to our delivery of TBL we have incorporated along the way.

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Improving Feedback and Individual Accountability in Peer Evaluations

Derek R. Lane and Paul G. Koles

The primary purpose of this workshop is to demonstrate how peer feedback processes can be used to reduce student uncertainty, increase individual accountability, and improve team performance.

Learning Objectives:

At the end of the workshop, participants will be able to:

1. differentiate between formative and summative peer feedback.
2. describe the relationship between peer feedback and group performance.
3. identify major factors that influence peer feedback in TBL groups.
4. recognize communication features in peer feedback.
5. explain techniques for helping students develop effective peer evalu-

ation criteria.

6. detail skills and justify procedures for helping students communicate constructive formative peer feedback--especially when such feedback contains negative messages.

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Taking TBL to an Online Hybrid Using Elluminate – Soup to Nuts

Mike Welker, North Central State College, Mansfield, Ohio

Moving online used to mean having to leave Team Based Learning behind due to a lack of ability to support the necessary live team interactions. However, after trial and error and discovering the Break out room features of Elluminate, a full TBL experience can now be easily offered in a synchronous Hybrid online format. This workshop will share the detailed "How To" of one template for this and discussion of considerations and implications in adapting TBL to this medium.

By the end of this workshop, the learner will:

- List particular issues inherent in taking TBL to a synchronous Hybrid format.
- Analyze potential methods and ways to account for various issues in your course design.
- Understand one detailed "how to" template to do this using Elluminate and Blackboard.
- Appreciate the possibilities and comparisons of the template to other online conferencing tools and course management systems.
- Understand the potential technical, policy and other "trouble spots" in this mode of instruction.
- Analyze potential strategies and methods to be prepared to address these trouble spots.

Oral Presentations—Session 2

Innovations in Team Based Learning

Moderator: Michael Sweet

An In-Patient Hospital Team Based Learning (TBL) Pediatric Curriculum

Johnnie Frazier

Beneficial Effects of Reflective Writing in a Biomedical Sciences Team-Based Learning Environment

Richard Sabina and David Rodenbaugh

Using Team-Based Learning in a Literature Survey Course

Boyd Creasman

The Impact of Team-Based Strategies on Student Performance in the Foundation Year of Medicine and Dentistry, University of Sharajah, United Arab Emirates

Esam Agamy

ABSTRACTS

An In-Patient Hospital Team Based Learning (TBL) Pediatric Curriculum

Johnnie P. Frazier, MD, MEd, Julia T. Shelburne, MD, Mark D. Hormann, MD, and Allison R. Ownby, PhD, MEd, The University of Texas Medical School at Houston

Background The Pediatric Medical Education Division was created within the University of Texas Medical School (UTMS) Pediatric Department in 2007 to address, monitor, and develop educational programs. One of the department's goals was to identify the educational needs of residents, students, fellows, faculty, and staff. An internal survey was administered to the residents to gather information on whether in-patient rotations emphasize service obligations (clinical care) over clinical education (formal didactics/interactive sessions). After a review of the survey data, gaps in resident clinical education were identified.

In response to this survey, the Pediatric Medical Education Division and Division of General and Community Pediatrics at The University of Texas Medical School developed and implemented a team based learning cur-

riculum on common pediatric in-patient diagnoses to address these clinical educational deficiencies for resident and student education.

Objective The objective of this project is to evaluate and assess the effectiveness of the in-patient pediatric TBL curriculum on residents' and students' education.

Methods From July to October 2008, one hundred six learners participated in the TBL sessions. The curriculum consisted of preparatory readings, readiness assurance quizzes, and interactive case discussions. Two teams rotated on the Lyndon B. Johnson Hospital-in-patient pediatric floor with teams consisting of eight to nine learners. Each team attended the TBL session three days per week. Each team had preparatory pre-session reading and a readiness assurance quiz when they attended the TBL session. The final component included an interactive case discussion based on the core topic. Over twenty different TBL applications (core topics) were developed by the general pediatric faculty. The chief residents and pediatric faculty were trained as TBL facilitators.

Results/Outcomes/Improvements At the end of each session all learners completed a LBJ Hospital Inpatient Curriculum Evaluation form which consisted of two Likert subscales (Materials and Content, Facilitator Skills) with 1=disagree strongly, 2=disagree, 3=neither agree nor disagree, 4=agree, and 5=agree strongly. Data from these evaluations will be summarized with emphasis on session organization, level of preparedness, relevance to patient care experiences, value added to knowledge on pediatric diagnoses as well as usefulness of pre-reading, facilitator effectiveness and overall value of TBL format to their learning will be reported¹. Analyses were conducted using SPSS. The scores were highly favorable with respondents reporting agree and agree strongly to all stem statements in the subscales.

Significance The program requirements for graduate medical education in pediatrics require that residents must have structured programs in training for learning. This project will report the efforts of the UTMSH's Department of General and Community Pediatrics in meeting these program requirements as well as satisfaction of the residents and students who participated in the TBL sessions. This project is significant as it describes an educational strategy that is innovation/interactive that other institutions could utilize to meet and engage their learners in learning and meeting program requirements.

¹ Approval from The University of Texas Health Science Center at Houston's Committee for the Protection of Human Subjects will be secured before the evaluation data are analyzed.

Beneficial Effects of Reflective Writing in a Biomedical Sciences Team-Based Learning Environment

Richard L. Sabina¹, Marshall W. Kitchens², and David W. Rodenbaugh¹,
Department of Biomedical Sciences, Oakland University William Beaumont School of Medicine, Rochester, MI ²Department of Writing and Rhetoric, Oakland University, Rochester, MI

Background: Developing interpersonal and team interaction skills and understanding how Team-Based Learning (TBL) promotes higher-level learning are critical steps in the genesis of a functional team. Reflective writing is recognized as a useful learning process where students gain some practical experience and are then asked to reflect on that experience. Although these reflections are initially solitary, communal exposure to others' writing can promote a richer learning experience and facilitate interpersonal interactions between the writer and readers. TBL¹ and the reflective writing/sharing process² are both recognized as having important uses in medical education. This prompted us to incorporate reflective writing into a biomedical sciences course centered on TBL and to evaluate its usefulness in this active learning environment.

Description: Nine students participated in a 7-week integrated biomedical sciences course (4 credits) on Type 2 Diabetes Mellitus offered to pre-medical and post-baccalaureate students. Weekly course structure included two interactive preparatory sessions (Mondays and Wednesdays) and a TBL exercise (Thursdays). Reading assignments and a class discussion prepared students for the reflective writing components of the course. Four 500-1000 word on-line postings tracked student attitudes and experiences with learning-style history (week 1) and TBL experiences (weeks 2, 4, and 7) and how those attitudes evolved during the course. In two postings (weeks 1 and 4), students shared their reflective writing in a public forum in the form of creative nonfiction, imagined diary entries from alternate perspectives, and narrative poetry, whereas the two remaining assignments prompted students to reflect in private postings on their formative (week 2) and summative (week 7) TBL experiences. A fifth posting (week 7, also private), focused on the role of reflective writing in relation to their course learning experience.

Evaluation: The majority of students (6 of 9) cited early positive changes in their attitudes towards TBL in private formative postings (week 2) and all students extolled its virtues in private summative postings (week 7). Student attitudes toward reflective writing also changed, with the majority (6 of 9) indicating initial concerns about the prospect and/or purpose of these postings in a biomedical sciences course. In contrast,

by course end students cited reflective writing/sharing for 1) promoting understanding of their own and their peers' thought processes (9 of 9), 2) facilitating interactions with their peers (4 of 9), and 3) enhancing team dynamics (2 of 9). Open forum postings followed by unanticipated additional online exchange between students appeared to reinforce these perceived benefits.

Conclusions: Reflective writing can be used as an engaging on-line forum for peer communication in the TBL environment with potential benefits to both students and faculty that facilitate learning. Through reflection, students appear to gain a better understanding of not only how they personally learn, but also appreciate team dynamics and how their peers are learning. When used in an open forum, reflective writing can add another dimension to peer evaluation. For faculty, reflective writing offers a wealth of information to foster the instructor-student relationship while providing an enjoyable medium for monitoring team dynamics.

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Using Team-Based Learning in the Literature Survey Course

Boyd Creasman, Director of School of Fine Arts and Humanities West Virginia Wesleyan College

Background: After years of long reading lists and cursory reading and little retention of information in literature survey courses, a professor turned to team-based learning and the students read more deeply.

Description: The course, England the Heritage II (a British literature survey) was structured around questions that students worked on in teams. Each question involved students choosing between alternate interpretations of literary works. The instructor covered fewer works and fewer authors in favor of deeper analysis. Over the course of the semester, the students answered twenty-five questions, from which essay topics were developed. These questions, when correctly answered, offer the opportunity for a high level of understanding of the literature.

Evaluation: Rubrics were used on the essays to measure the quality of the written work. The students' aggregate results were above 80% in every writing criterion, above 90% in some of them. Journal entries revealed a higher level of engagement than typically found in a survey course. Examples will be provided. Conclusion: Perhaps something is lost in terms of coverage of works and writers, but there is no denying

that the level of student engagement and the depth of understanding of the literary works were extremely high. The best strategy is to define a number of desired learning outcomes and use team-based learning to help students achieve them.

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The Impact of Team-Based Learning Strategies on Student Performance in the Foundation Year of Medicine and Dentistry, University of Sharjah, United Arab Emirates

Esam Agamy, Ph.D., and Hossam Hamdy, M.D., College of Medicine, University of Sharjah, United Arab Emirates

Background: Students join the University directly after obtaining their high school leaving certificate. Admission is based mainly on their school academic achievements and proficiency in English, which is the language of instruction. In the two colleges (Medicine and Dentistry), the program is six years - a foundation year followed by five years of medical and dental studies. The main aim of the foundation year is to reinforce their knowledge in subjects like Biology, Chemistry, and Physics.

Description: In order to prepare the students to their future studies in a problem based learning environment, the Human Biology course was delivered using the TBL approach. The challenge encountered was how best to teach this course in the foundation year, which is subject based, teacher centered with limited human resources. The aim of this study is to describe experience in using TBL in a non-traditional course, report students' reaction to TBL, its feasibility, effectiveness and efficiency.

Evaluation: 140 students participated. At the end of the course, students completed a course evaluation survey with three subscales: learner participation, learner enjoyment of class, and instructor performance. Students also gave written reflection at the beginning, middle, and end of the course. Every student completed a peer evaluation form for his/her teammate.

Conclusion: Comparing the previous traditional lecture methods, students responded best to TBL, in terms of width and depth of knowledge, knowledge retention, engagement, and transferable skills.

Poster Abstracts

101: Teaching Literary Analysis Using Team-Based Learning

Jeanine S. Alesch, Ph.D.

Background A course in literary analysis may, at first glance, appear to be incompatible with team-based learning (TBL). Professors of literature tend to value open-ended questions, and insist upon the infinite number of interpretations that can be derived from any piece of literature. The assignments in traditional literature courses usually reflect this mindset: students do close readings, and write research papers and/or thematic studies; tests, if they are given at all, usually contain essay-style questions. These assignments emphasize the students' acquisition of personal knowledge and skills; class discussion can be either lackadaisical or fervent, without affecting students' apparent understanding of the material, the quality of their papers, or their final grades. Importantly, such assignments also impose a significant burden on faculty, especially as enrollments rise in literature courses. Faculty members may feel forced to choose between maintaining an appropriately rigorous workload for students, and spending excessive amounts of time reading, grading, and responding to student writing.

Team-based learning opens up new vistas in literature classes. The faculty member creates short-answer questions that focus class discussions sharply on particular issues or kinds of analysis. This process requires students to engage in new ideas, usually expressed in sophisticated language, rather than relying on interpretive or language skills they already possess. Additionally, the nuances of both the questions and answers force students to pay acute attention to written language, which is always a primary goal of literary study. The emphasis on group discussion and the interdependence of team members compel students to develop their speaking skills, and organize their thoughts coherently. Because they must actively argue in favor of certain ideas or opinions, students gain insight into the value of their, and others', viewpoints.

Description At the University of Utah, a course entitled "Introduction to World Literature" is required for all undergraduate students majoring in a foreign language. Students are encouraged to take the course during the first or second year of study, although a certain number take it during their senior year. The course's primary goal is to teach students what it means to study literature. What does literature do? How does a text work? What kinds of questions can be asked of literature, and how does one go about finding some kind of answers (or, better yet, new and more interesting questions)? I taught this course in the fall of 2009 to a section of fifty-four students, applying the methods of TBL rigorously.

Results TBL is compatible with the study of literature and successfully fosters the development and articulation of complex, nuanced ideas -- skills that lie at the heart of literary analysis. Many of my observations correspond to those reported by faculty members using TBL in other fields. Students began to identify with their team on the first day of class, thereby sparing them the anonymity that can beset such a large group of students. The attrition rate was extremely low; the class had been capped at fifty-five students and fifty-four completed the semester (several dropped the course during the first week and were replaced by new students, who were assigned to existing teams). Students tended to prepare well for class sessions, in order to perform well on the readiness assurance tests and support their teams. Discussion was animated, even passionate. By the end of the semester, these introductory-level students were debating, articulately, concepts that are difficult for many graduate students in literature. Significantly, the class overwhelmingly produced good to excellent individual papers at the end of the semester. They successfully transferred the skills and insights they honed in their teams to their personal work.

Conclusion The goals of courses in literary analysis are compatible with TBL methods. In fact, TBL offers, to both students and faculty members, significant advantages over more traditional instructional methods.

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102: Implementing Team Based Learning in Large Classes: Nurse Educators' Experiences

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Background: At the UBC Okanagan School of Nursing, teachers had a number of concerns (such as the huge volume of content that students were expected to learn) and were continually searching for better, more effective ways of teaching. In particular, teachers were interested in finding ways to encourage students to better prepare for class and methods to increase student engagement in the classroom.

Description: In 2009, the teachers in the second year of the BSN program decided to re-design four nursing courses to incorporate team-based learning (TBL).

Outcome: The implementation of TBL is now in its second year. Some courses have been fully converted to a TBL format, while other courses use TBL principles to teach certain topics within the courses. Re-designing these courses to incorporate TBL involved a significant amount of time and effort for the teachers, and implementing TBL in the class-

room presented many challenges for both teachers and students. In the beginning, teachers were often fatigued, stressed and frustrated due to increased workload, student confrontations, and technological difficulties. In some cases, exam marks were disappointing. However, the challenges were balanced by benefits, including enhanced student preparedness which allowed teachers to spend more class time discussing complex realistic nursing problems, reduced attrition, and reduced student-reading workloads. Some clinical teachers felt that students were better prepared to care for patients, more knowledgeable and confident, and worked together more effectively in the hospital to problem solve and discuss clinical situations.

Conclusion: Overall, in spite of the challenges, most teachers and students have been pleased with the results. As teachers continue to develop skill with the TBL method, questions are still being sought to questions such as: What is the most effective method of incorporating peer evaluation? And, how many TBL modules should be incorporated in a single course?

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103: Development of an Undergraduate Pre-Medical Student Course Using Team-Based Learning (TBL) to Integrate Basic Sciences.

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Background: The integrated, organ-based curriculum at Oakland University William Beaumont School of Medicine will use TBL as one of several student-centered pedagogies to train our medical students. The Scientific Foundation of Future Physicians report emphasizes the adoption of competency based curriculum within both undergraduate and medical education. As such, our faculty wanted to offer an integrated biomedical science transitional course to undergraduate premedical students.

Description: The seven week long summer course was centered on Type 2 Diabetes Mellitus and used TBL as the primary pedagogy to foster student engagement. Six months before the course began, faculty members with expertise in epidemiology, anatomy, nutrition, biochemistry, pharmacology and physiology met to develop course objectives and establish a temporal sequence of course content. This was followed by

the formation of working groups, each of which was responsible for one week of curriculum structured as two 2-hour preparatory sessions and a 2-3 hour TBL exercise. The weekly TBL exercises were integrated and included readiness assurance tests, an additional active-learning group activity (i.e., concept mapping, data interpretation, model building, etc.), followed by a group application. In addition, we used several innovative applications, including the use of reflective writing, a glucose-tolerance test lab experience, and a patient-centered longitudinal exercise.

Results: Teams performed well on the weekly TBL exercises, indicating a strong understanding of course material, which was overwhelmingly cited in student course evaluations. Healthy team dynamics were fostered through peer evaluation and open forum reflective writing on their group experiences, which clearly improved the depth of discussions both within and between teams. Consequently, faculty consistently cited extreme satisfaction with the level of student engagement. Finally, working together to develop and deliver this integrated course increased faculty communication and modeled the value of teamwork for the students.

Conclusions: Integration of basic sciences in a TBL environment is a highly effective student-centered learning experience. We believe taking a course such as this is an additional preparatory benefit for pre-medical students as more medical schools adopt a team-based curriculum.

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104: Mapping TBL and other course level innovations to NSSE/AUSSE engagement data for improved student engagement in undergraduate entrepreneurship courses

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Background: The entrepreneurship education literature identifies many aspects that are desirable for inclusion in entrepreneurship courses at the university level. It is, however, difficult to know which are the most effective for engaging students. This paper describes a pilot project of mapping a range of innovative teaching activities to AUSSE engagement results to identify those most likely to contribute the most to creating engagement at the course level, and piloting those activities to assess their effectiveness in engaging students.

Description: The importance of student engagement has been highlighted in the US National Survey of Student Engagement (NSSE) that includes global measures of engagement in effective educational practices. Similar measures have been taken up in the Australasian Survey of

Student Engagement (AUSSE). This pilot study addresses the challenge of relating course-level initiatives to the global measures of student engagement used in these large-scale research programs. The detailed results of the AUSSE Study carried out by the Australian Council for Education Research (ACER), and reported in "Engaging Students for Success" (2009), were used in a mapping process to arrive at a selection of initiatives that promised to lead to an improved level of engagement. It is proposed that this purposeful approach for identifying teaching activities is a more robust approach for achieving course-level engagement than simply selecting from menus of what are considered to be "desirable" activities to include in entrepreneurship courses.

Results and Implications: The mapping process identified several major activities that were implemented in two different undergraduate entrepreneurship courses in 2010. These activities included, firstly, the implementation of Team Based Learning with its series of multiple choice tests and in-class assignment activities designed to reinforce team interactions, resulting in improved engagement and more productive team work. This appears to be the first implementation of the Team Based Learning approach in entrepreneurship courses in Australia. Secondly, all students in a class address the same business idea and present their major assessments as poster reports to the whole class in a presentation and review session. Students examine and compare the work that other teams have carried out, and obtain immediate feedback on their work, both from their peers as well as from academic staff and practising entrepreneurs. This activity supports the Team Based Learning approach. Students learn from others, and are engaged in both the production of the reports and their evaluation.

Conclusion: Qualitative evaluation of these courses supports the proposition that these two key activities, and in particular, Team Based Learning, map effectively to AUSSE data, and lead in practice to improved student engagement. This pilot study lays the basis for further research to quantify the impact of these approaches on student engagement.

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105: The Impact of the Readiness Assurance Process on Virtually Isolated Adult Learners

Matt Barclay, Utah State University

Background: A few years after the World Wide Web was extensively adopted, Wilson and Lowry (2000) claimed, "the Web will increase its value as a learning resource to the extent that it can bring people together rather than isolate them." (p. 85). This belief comes from the research on different strategies which show that various forms of collaboration lead to greater improvements in learning compared to independ-

ent study (Chapman, Ramondt, & Smiley, 2005; e.g., Michaelsen, Watson, & Black, 1989). However, there are millions of adults who use the Internet as a “learning resource” but who are isolated in that learning. As incongruous as that sounds in our current world of connectivity and globalization, there is much web-based instruction (WBI) that does not and may never provide learners with tools to collaborate on the web. For example, most of the popular OpenCourseWare (OCW) projects from various universities and other institutions around the world offer no options for online collaboration with professors or peers.

Description: The purpose of this study was to discover whether adults can achieve better learning outcomes when they use at least the Readiness Assurance Process (RAP) of Team-Based Learning (TBL) within the limits of virtual isolation. Although some isolated learners may of their own initiative gather with others in their immediate geographic locations to study WBI materials together, the focus of this study was in discovering whether an online version of the RAP in TBL helps people learn better together (side-by-side) when in virtually isolated educational settings compared to people learning independently. To evaluate the effects that TBL has on virtually isolated adults using WBI, the author created a short online social sciences course and tested it with 116 adults in a randomized pretest posttest experimental design.

Results: Preliminary data analyses indicate a statistically significant difference in test scores (Bloom's levels 1 and 2) between those who worked in teams with the RAP and those that did not. Tests scores where questions representing Bloom's level 3 and higher showed no statistically significant difference. Interpretation of these results is given.

Conclusion: This study provides evidence that the RAP can even help groups achieve greater learning outcomes when working face-to-face in virtually isolated online educational settings. Instructional designers and other educators would do well to consider implementing at least some elements of TBL in such online settings. Millions of lifelong learners could benefit significantly with at least the RAP in place.

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106: Engaging Learners & Faculty in an Integrated Organ-System Based Curriculum By Starting with the “General Principles” of Medicine and Science

Angela M Bier, MD, Deborah Simpson, PhD, Michael Olivier, PhD Medical College of Wisconsin

Background: Medical schools across the country are integrating their curriculum using multiple approaches from organ-system based curricu-

lum to “top 100 medical conditions”. Independent of the integrating framework selected, the schools often deliberate about how to “start” their curriculum. Should one begin with an organ system/problem and if so which one? Are there general cross-cutting principles that should be introduced prior to the organ/problem?

Description: The Medical College of Wisconsin has embarked on a curriculum revitalization moving from a traditional discipline based, lecture dominated curriculum to an organ/system based, TBL driven curriculum. Out of a class of 204 first-year medical students, a self-selected group of 28 are learning in a so-called pilot integrated curriculum. Based on the input from multiple college-wide retreats, working groups, and oversight committees a 9-week General Principles Module has been implemented. The General Principles Module uses TBL as the first instructional unit to 28 medical students participating in our pilot integrated curriculum. Through a systematic design process, cross-cutting, foundational principles were identified, objectives delineated and over 40 TBL exercises were developed to align with these principles and objectives. Evaluations were obtained from students and instructors after each TBL exercise. Assessment included i-RAT, G-RAT and multiple choice examinations, a multi-rater evaluation associated with strong team and member performance, and an OSCE.

Outcomes/Evaluation: 28 pilot students and over 30 faculty participated in the General Principles Module. Student evaluations of the TBL exercises were consistently strong and instructor evaluations emphasized common strengths associated with TBL (e.g., active engagement of students and instructors, value of the quizzes in identifying and correcting knowledge gaps). Student performance was comparable to students performance in our traditional curriculum.

Conclusion: Module leaders and instructors continue to evaluate which concepts are critical as “foundational” for remaining organ/systems-based curriculum modules. However, students and faculty alike agree that providing these cross-cutting concepts and principles using a TBL format, while challenging, is an essential first module in an integrated curriculum and aligned with the USMLE Step 1 domain(s).

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107: The Assessment of a Multi-method Peer Evaluation Tool

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Background: Peer Evaluation is a critical element of Team Based Learning (TBL) because it is a way for students to provide feedback to their peers; but, creating a tool that captures meaningful feedback is difficult. Previous peer evaluation tools used within the Regis University School of Pharmacy showed that when heavy emphasis was placed on the graded element of the tool, students "straight-lined" towards the highest grades to avoid harming their peers grades. Conversely, ungraded tools were not taken seriously, and many students did not complete the assignment. In both cases, peer evaluation was not a meaningful factor in the students' grades, and academic advisors were unable to provide meaningful feedback to their advisees. Therefore, an initiative to develop a peer evaluation tool that would be academically meaningful and formative was undertaken.

Description: A new peer evaluation tool was created through the collaboration of a faculty and student task force. The resulting tool uses a multi-method structure to capture three forms of feedback: (1) forced choice ranking, (2) a behavioral checklist, and (3) qualitative feedback. Students were responsible for rating their teammates and themselves at the conclusion of a course. The feedback allows the students to identify areas where they are performing well and areas to improve upon.

Results: The graded section of the assessment yielded more dispersion of grades than previous tools. Over 75% of the students received an "A" for the peer evaluation compared to all students receiving an "A" with previous forms. Additionally, grades ranged from D to A. These results indicate most students rate each other as competent teammates, but are willing to rate poor performances below average and reward those who excelled as teammates.

At the end of the term, advisors use the assessment to discuss areas where their students can improve or where they excel. The rankings and behavioral checklist provide quantitative data that is easily comparable to other students and provides a summary of how the students are performing. The qualitative feedback is used to support the rankings and behavioral checklist and can also provide more detailed information.

Conclusion: The grade dispersion and positive faculty feedback indicate the multi-method peer evaluation tool was an effective assessment and development exercise, and will be used for future peer evaluation.

108: The influence of transactive memory on group performance during simulated healthcare team training events.

Jim Carlson, MS, PA-C, John Tomkowiak, MD, MOL

Background: Team based simulation is an increasingly common methodology used to train healthcare professionals, but few mechanisms exist to measure and define the relationship between team performance and patient outcome. Transactive Memory System (TMS) theory explores the value of team interdependence when accomplishing group work. Specifically, TMS theory suggests that an effective team needs; a) expertise (diversified knowledge with each member possessing some degree of information not known by other team members), b) trust, and c) coordination processes that effectively pool the collective expertise of the team. Lewis (2003) developed and validated a field tool that reliably captures the traditional TMS construct in established teams within organizational settings. The purpose of this study was to adapt Lewis' TMS field for use within healthcare simulated training events and to determine the relationship between TMS and the standard of medical care delivered during a series of simulated case studies.

Methods: Medical (MD) and Physician Assistant (PA) students participated in a team training workshop during their clinical education. During each workshop teams worked together to manage one of three mannequin-based simulations (Acute Myocardial Infarction, Anaphylaxis, and Tension Pneumothorax). Teams were tasked with collecting clinical information and managing the simulated case. Faculty observers globally rated team performance in four areas; clinical knowledge and skill, teamwork, error potential, and overall. Team members individually completed a modified version of the Lewis TMS field tool resulting in an aggregate self-reported TMS score for each team. Instrument reliability was explored. Spearman's rho was used to explore the relationship between self-reported TMS domains and faculty global performance ratings.

Results: Forty-five teams participated in the study (n=15 for each case). Faculty global ratings and the adapted TMS field tool demonstrated substantial reliability (Cronbach's alpha > 0.7). Several significant correlations (p < 0.05) were noted between TMS sub-domains and faculty global performance ratings. Specifically, expertise appeared to mediate a reduction in error potential, trust appeared to mediate teamwork behaviors, and the TMS coordination domain had a significant relationship with clinical knowledge/ skill and overall performance ratings. **Conclusions:** This is one of the first studies to demonstrate the relationship between transactive memory and team performance during simulated healthcare training activities. Self-reported measures related to

the TMS domains of expertise, trust, and coordination may offer an efficient theory driven method for capturing and debriefing healthcare team performance.

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109: Reducing Attrition from General Chemistry I (CHE 130) by Implementing Team Based Learning

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Background: General Chemistry (CHE 130) is the first chemistry course taken by chemistry and biology majors at Salem State University. The course is important for recruiting and retaining chemistry majors, but high attrition has been a long standing problem. In the last 20 years, I have taught this course 33 times in a more traditional format using lecture and informal group work. The average attrition over that period was $36\% \pm 10\%$, and there has been a gradual downward trend for that period with the average attrition of $30\% \pm 7\%$ over the last two years.

Description: I implemented team based learning (TBL) in the spring of 2010. The course material was divided into seven instructional units. Each unit consisted of a reading assignment, an individual readiness quiz, a group readiness quiz, team problem solving and an hour exam. This semester, the course material was divided into five instructional units. This left time for more complex team problem solving exercises.

Results: In the spring, the attrition from this class was 24%. Grades from this semester are not yet finished, but the attrition is likely to be less than 30% from each of my two sections.

Conclusion: Although initial results are promising, there is not yet enough data to conclude whether TBL has significantly reduced attrition from General Chemistry I.

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110: Designing Team-Based Learning Modules to Meet Professional Critical Care Nursing Competency

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Background: Critical care nurses work in dynamic, high stake clinical environments where rapid, accurate complex decision making is vital. A

world-wide shortage of critical care nurses has raised the requirements for postgraduate critical care course students to function at a higher level clinically with reduced supports. To enhance the acquisition of discipline specific graduate attributes, in the form of the Australian College of Critical Care Nurses' (ACCCN) Competency Standards for Specialist Critical Care Nurses, Team-Based Learning (TBL) was integrated into existing postgraduate critical care nursing program curricula. Existing curricula for critical care programs were designed with a focus on what we want students to be able to do as professional critical care nurses rather than what we want students to simply know. Thus, a natural fit existed with TBL which also emphasises teaching to ensure students gain functional knowledge not simply declarative knowledge and skills.

Description: The aim of this paper is to describe strategies to successfully integrate TBL modules into existing curricula to meet requirements for professional competency, industry and University academic awards. The use of constructive alignment which incorporates constructivism in learning and alignment in the design of teaching and assessments so that intended learning outcomes, class content and assessment are wholly aligned will be described. Rationales for the purposeful and carefully designed alignment, along with TBL were communicated with students in written and verbal forms regularly.

Outcomes: Students adopted TBL readily. The synergy between TBL and constructive alignment enhanced acquisition of professional competence on graduation because intended learning outcomes based on discipline specific and generic attributes were taught and assessed both in academia and industry. Significantly, students demonstrated acquisition of key competencies while undertaking the course rather than after graduation. Examples of this alignment will be described with reference to Deakin University's Postgraduate Diploma of Nursing Practice (Critical Care) curricula.

Conclusions: TBL has complimented and enhanced the connection between intended learning outcomes, teaching and learning activities, and assessment tasks resulting in graduates mastering the discipline specific attributes outlined in the ACCCN's Competency Standards for Specialist Critical Care Nurses.

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111: Assessing Medical Student Perceptions of Graded vs. Ungraded Group Application Exercises in Team Based Learning

AS Deardorff, JA Moore, CM McCormick, PG Koles, NJ Borges

Background: While graded Individual and Group Readiness Assurance Tests promote advanced preparation, the cornerstone of each TBL module is the Group Application (GAP) exercise. In the 2009-2010 academic year, our school moved from a graded GAP exercise to an ungraded GAP exercise in the MS2 curriculum, eliminating team and individual grades as a motivator for students to actively participate in group problem solving. The current study attempts to determine the impact of graded vs. ungraded GAP exercises on the student TBL experience as well as to identify specific factors that contribute to students preferring graded or ungraded application exercises.

Methods: With Institutional Review Board approval, the 2009-2010 second year class (n=86; 96.6% response rate) at a midwestern medical school was administered a 22-item Likert questionnaire, with 3 "write-in" questions. The population selected for study is the first class to participate in a TBL-supplemented preclinical curriculum with graded GAP exercises during year 1 and ungraded GAP exercises during year 2, placing them in a unique position to comment on student experiences in graded vs. ungraded GAP exercises.

Results: While our descriptive data indicate the perceived effectiveness of GAP exercises in generating knowledge outcomes and developing teamwork skills is mostly independent of grade weight, 82.7% of students polled prefer ungraded GAP exercises with only 6.2% preferring graded. Furthermore, 54% of students perceived that ungraded GAP exercises create a lower-stress learning environment, in which they are more apt to listen to classmates and participate in discussion. Correspondingly, greater than 50% of those students preferring ungraded GAP exercises perceive an improvement in the quality of inter-team discussion with ungraded GAP exercises.

Conclusions: Medical students perceive reduced stress and improved quality of group discussion without sacrificing quality of learning or professional development when GAP exercises are ungraded.

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112: The Use of Team-Based Learning Strategies Combined with Simulation in Medical Education

Tochi Iroku-Malize MD, MPH, FAAFP, SFHM, Michael Delman MD, FACP, FACG, Brenainn Flanagan, MD, Hofstra-NSLIJ School of Medicine Family Medicine Residency Program at Southside Hospital

Background: For several years, we had Family Medicine Residents and Medical Students participating in weekly scenarios (simulation) using PC-based interactive, digitally enhanced mannequins and at times live actors. The object was to promote learning in an environment without risk to real patients while allowing time for self-reflection via debriefing sessions. After debriefing (via playback of the videotaped scenario), a formal Power Point presentation was given by the instructor and then the participants were allowed to repeat the scenario. Over time we have evolved, and the scenario (patient interaction), which used to be individual based, is now team based. Over the past year, we have incorporated Team Based Learning into the sessions. This has allowed greater participation by the residents and students with greater enthusiasm for the sessions.

Description: The course consists of a pre-class reading of a topic, an individual readiness assurance test when they come to class followed by a group readiness assurance test. The TBL activity is then facilitated after which the teams take turns applying their knowledge in the scenario (patient interaction). Upon completion of the scenarios, the teams reconvene for debriefing, reflection (they watch themselves from the video) and further discussion of the topic.

Evaluation: Over 100 residents and medical students have participated. At the end of each session participants completed an evaluation form. A Classroom Engagement Survey has been distributed to the participants with four subscales: Learner Participation, Learner Enjoyment of Class, Patient Safety Elements and Team Work Awareness. Analyses are currently ongoing comparing the difference in rating between the simulation sessions alone versus the simulation combined with TBL sessions.

Anecdotally, the preliminary evaluations from the participants in the simulation combined with TBL sessions have been more positive than those of simulation alone.

Conclusion: Of the two methods, students responded best to simulation combined with TBL, adding to the list of methods for teaching clinical topics to residents and medical students.

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113: Team-based Learning in Community College Nursing Assistant Courses: Making the Move from Web-Enhanced to Hybrid

Gail Feigenbaum, RN, Phd, Sunay Palsole, Phd

CONTEXT: Our students at Central New Mexico Community College (CNM) are diverse and include: dual enrollment high school students, single parents without GEDs, traditional high school graduates going on to nursing school and other health careers, those with college degrees wishing to re-train for a health care position, as well as senior citizens. A significant portion of our students have met most nursing school prerequisites. We also have a large number of ESL students.

Our nursing assistant courses run a total of 150 hours--100 hours of theory/lab; and 50 hours of supervised clinical experience in a local health care facility. The face-to-face sessions typically run six hours/day from three to four days/week. This program meets nursing school entrance requirements and offers a broad base for other health care careers. Successfully completing the course also permits students to sit for the Nursing Assistant State Certification exam.

I have used Team-Based Learning (TBL) exclusively for teaching the nursing assistant courses as well as staff development sessions since 2004. The approach has been enormously successful in terms of student retention, learning and enjoyment of the learning process. In 2006, I wanted to save resources and reserve classroom time for active TBL. I thus web-enhanced the team-based learning experience, finding that Blackboard supported all of the TBL tenets, in particular responsibility, communication, and team connectedness.

DESCRIPTION: Given my success with TBL enhanced with Blackboard, I have been transposing some components of the Readiness Assurance Process (RAP) to an online format. In consultation with Sunay Palsole at the University of Texas at El Paso, I am now using online iRATs, some

online gRATs (most gRATs are still completed face-to-face) and several online team application activities. Team contracts, peer evaluations, and clarification "mini lectures" also occur online. In addition, students participate in online team and whole-class discussions. Students also use weekly online days to complete some of the theory-generated activities noted above. During online days, the lab is also reserved for optional student practice of nursing skills.

As I moved further into the hybrid arena, I wondered whether students would continue to reap similar benefits of TBL with more requirements to be met on line.

RESULTS: Grades, retention, classroom/online energy and anecdotal reports from students indicate that TBL continues to be the favored approach for teaching and learning in nursing assistant courses. In addition, students enjoy the convenience of asynchronous online activities as well as saving paper and other resources.

CONCLUSION: Well designed team-based learning activities lead to successful TBL in the hybrid environment. I will expand the model in two fully hybrid nursing assistant sections (fifty percent face-to-face and fifty percent online) in the Spring of 2011.

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114: A New Tool for Peer Assessment in Team Based Learning

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Background: In team-based learning peer assessment is used to evaluate each individual's contribution to the success of the team and is considered an essential component of the grading process. It is well documented, however, that peer assessment is met with heavy resistance and this was evident in the inaugural year at Regis University School of Pharmacy. "Straight- lining" of student peer assessment scores, leading to inflation of the individual component of student grades, gave cause to drop the grade weight of peer assessment from 10% in the fall semester to 2% the following spring. In addition, the assessment tool's inability to capture qualitative feedback from peers made it difficult for students to identify areas for improvement and ultimately led to the decision to create a new tool for the 2010-2011 academic year. Herein we present both the original and revised tools and suggest that peer assessment is

an ongoing process that includes components of education, practice and execution.

Description: In order to create an effective peer assessment process a task force was assembled. The task force sought out the greatest level of student engagement possible, and to that end, student representation was equal to that of faculty representation. The task force created a process that includes education on how to assess one's peers, the administration of both a formative (midterm) and summative (end of term) peer assessment, and a mandatory review of the formative results with faculty advisors. Advisor-mediated review dictates that feedback is anonymously presented to students and assists students with identifying areas where they are able to improve prior to the summative peer assessment.

Results: The education component began at orientation for the incoming class and included both a PowerPoint presentation delivered by a student representative of the task force and a team application activity that provided practice in recognition and assessment of common team behaviors. Included in this component was a faculty-facilitated skit that exhibited both 'effective' and 'blocking' team member behaviors. A new assessment tool was created containing three parts: (1) forced ranking in the categories of Responsible, Supportive, and Principled, (2) a behavioral checklist (including both beneficial and harmful behaviors) and (3) required written comments (including one positive statement and one statement that is intended to bring improvement in a given area.) Upon completion of the formative peer assessments students were required to meet with their faculty advisors to discuss areas in which the student has performed favorably and to identify areas where that student may need improvement to provide a higher benefit to their team. This allowed students to witness how the evaluation would be translated into a grade, and provided individuals with the opportunity to change behaviors before the summative evaluation.

Conclusion: Regis University School of Pharmacy has created a new and unique peer assessment process with student input that we believe will benefit student and team growth. The process of peer assessment begins with education, follows with a midterm formative assessment and concludes with a summative peer assessment. The re-evaluation and restructuring of this process highlights peer assessment in new TBL schools as an iterative process, where tools and processes are changed as they outlive their use

115: Approaches to Peer Evaluation: Pro's and Con's of Various Methods

Rick Goedde, St. Olaf College, Jim Sibley, University of British Columbia

Background: A wide variety of peer evaluation methods are in use across the TBL community (including but not limited too...Fink, Michael-son, UBC/Ostafichuk, Wright State/Koles, University of Kentucky/Lane, University of Texas). It would be a value to the TBL community to understand the variety of common peer evaluation methods, outline their strengths, weaknesses, and implementation strategies.

Description: The poster will describe a variety of peer evaluation methods and their merits, highlight implementation advice, and describe various modifications that have been employed to improve the peer evaluation process; including student setting of grade weight and evaluation criteria, assessment of quality of written student peer feedback comments, semester timing of evaluations, and the use of enforced score differentials (i.e. one student must get 9 and another 11 in a 10 point evaluation). We will also highlight common student concerns and various methods that help address student concerns.

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116: Applying Team-based Learning Principles and Strategies Online with Avatars in Teacher Education Courses.

Dr. Greg Levitt & Dr. Steven Grubaugh, UNLV and Dr. Richard Speaker, University of New Orleans

Background: Most teacher education students have taken online courses and are familiar with online learning conventions and protocols such as reading materials, responding to guiding questions and activities, and writing responses and papers of various sorts. However most online "conversations" have been text-based where students read and write to learn. This poster session describes an innovation where students build Avatars online and use them to work in a Team-Based Learning (TBL) environment. This allows students to actually communicate vocally with each other through the Avatars online, and operate in a socio-technological team-based philosophy of learning using online resources and their Avatars as motivational devices to leverage learning outcomes.

Description: Our university faculty, like most, teaches through face-to-face as well as online instruction. One of the courses that we hybridized is a face-to-face Content Area Literacy course with math, science, Eng-

lish, social studies and art education students. The course is hybridized by including 4-5 weeks of online instruction with the remainder consisting of face-to-face instruction. Students were asked to sign up for Second Life (SL) and develop their own Avatars. We then assigned students to heterogeneous content area team-based learning groups. The students, represented by their Avatars, were able to apply the principles and strategies of team-based learning including the use of the RAP test (individually and in teams) online, complete their follow-up reading and mini research assignments, and have their Avatars question the Instructor's Avatar to clarify concepts under study. Students work in Avatar groups to facilitate online spoken discussions rather than use written text. Avatar teams were given credit for in-class application activities and longer-term team projects. Team members were awarded points for contributions and docked points for partial or non-participation. Teams developed PowerPoints on digital screens in Second Life to present to the whole class through their Avatars. As a demonstration of the Second Life program, Dr. Speaker will join us for our poster session as his Second Life Avatar with an online virtual poster and respond to questions related to the main poster being presented.

Results: Students involved in virtual team-based learning were able to meet major course objectives related to real world teaching applications as well as master important standards-based guiding questions through the Avatar facilitated team-based learning approach. The online teams experienced success in making PowerPoint presentations to the entire class in Second Life as well as through Avatars presenting spoken presentations and conducting discussions with the entire class. Assessments were also conducted on the team-based learning process as well as content learned. Although some students still resist this level of technology, most report that the use of Avatars is engaging and motivating and facilitates real time conversations, collaborations and interactions. Avatars present a degree of anonymity for discussing unpopular or controversial issues and provide an added degree of authenticity to the discussions. Students also expressed their appreciation to learn about the various aspects of team-based learning including application exercises, importance of content to their future work, the process of team maintenance and contributions, critical thinking techniques and exercises and using effective collaboration and negotiation for deeper and more significant learning outcomes.

117: Using TBL in an Upper-Level Undergraduate Research Methods Course in Psychology: If at First You Don't Succeed...

Lisa Hager

Background: I teach a two-semester sequence of psychological research methods (Descriptive Research Methods in the fall semester and Experimental Research Methods in the spring semester) with both courses being writing intensive. I have been using group projects for several years but have had students do individual papers and have conducted the rest of the class using individual and small group assignments with some lecture. Since the courses involve the application of research methods they seem to be naturals for the TBL pedagogy. During the Fall 2009 semester I decided to adapt the Descriptive Research Methods course so that I could teach it using a TBL format. One challenge for me was that no one else at my institution uses TBL. My only experience with TBL had been at a Case Studies in Science teaching workshop where I was introduced to the pedagogy. A second challenge was that the methods course is writing intensive and I wanted students to write team proposals (something that I had been cautioned to avoid) and some individual papers.

Implementation/Results: At the end of the semester I administered the institution's annual Student Reaction to Instruction (SRI) forms and an 8-item survey I had created. Students' evaluations of my teaching (SRIs) were 1.5 to 4 standard deviations below what I normally receive for the class and students' responses on the 8-item survey indicated that most students did not favor the TBL pedagogy. Students' qualitative responses on the SRIs showed 100% of the respondents making negative comments about TBL. I made several adjustments for the Fall 2010 semester including: (a) reducing the number of peer assessments; (b) changing the type of peer assessment; (c) providing detailed handouts for each module including objectives of the activities, objectives from the syllabus that would be met by the activities, and potential exam questions associated with the activities; (d) adding individual graded homework assignments that were due on the day of the teamwork and that were required for teams to successfully complete their tasks; (e) including in-class time for all team activities (even for the writing of team proposals); (f) adjusting the ranges for grading weights for the overall categories of team and individual assignments so that individual grades were worth more; and (g) adjusting the ranges for the grading weights within the categories so that individual papers and exams were worth more. After making these changes students' responses on the SRIs improved 1.5 to 4 standard deviations (back to their previously high levels) and students' responses on the 8-item survey showed large changes indicating students' positive views of the TBL pedagogy. Stu-

dents' qualitative responses on the SRIs showed only 20% of the respondents making negative comments about TBL.

Conclusions: The three major conclusions that I would draw from this experience are: (1) using TBL in a writing intensive course can be challenging when you include assignments that are written by teams but it can be done; (2) instructors should include several opportunities for students to evaluate TBL throughout the semester to not only improve students' learning but also to improve their experiences with team work; and (3) instructors should not be discouraged by less than enthusiastic reactions from students when they first introduce TBL. Instead it is important to collect data, talk to students informally, and to keep adjusting your method until you hit upon a winning combination.

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118: Introduction of Team-Based Learning Sessions into an Integrated, PBL Hybrid Medical Curriculum

Thomas Hill, Ph.D., Linda Olson, Ed.D., Kurt Borg, Ph.D., Patrick Carr, Ph.D., Kenneth Ruit, Ph.D., Nancy Vogeltanz-Holm, Ph.D.

Background: Since the inception of a Problem Based Learning (PBL) hybrid curriculum at our medical school twelve years ago, we have seen substantial improvements in our students' ability to function as a group. In the PBL model, students are tasked with identifying deficiencies in their knowledge base and correcting these deficiencies through self-directed learning. Students must participate not only as individual learners, but also as part of a group. However, PBL group learning environments do not usually fit the model of true team learning. TBL offers the opportunity for teams of students to work together toward a common goal with each student contributing toward that goal. In team learning, both individual students and the team are assessed to determine both the acquisition of factual information and the effectiveness of team function. To foster effective and competent teamwork skills in our students, we conducted a two-week pilot study of Team Based Learning (TBL) within the context of our existing PBL hybrid.

Description: Two weeks of the PBL curriculum at the end of Year 2 were adapted to incorporate TBL activities. These activities complemented the patient case studies used in our PBL small groups. At the end of each week, students worked within their regular groups to complete Individual and Group Readiness Assurance Tests that covered topics from their weekly lectures and PBL case study. Students then worked in teams to answer questions from a series of clinical scenarios relevant to the topics covered during the week of instruction. The small groups

convened in a lecture hall as a class, reviewed the questions, reported their answers simultaneously, and discussed the answers with faculty content-experts.

Results: Student satisfaction scores comparing PBL with TBL activities in our two-week pilot study indicated increased satisfaction with the discussion component provided by TBL. Students' scores on selected end-of-block exam questions demonstrated a small, but not significant, increase in student performance during the two weeks that TBL was included in the curriculum. Student comments also indicated that they learned the topics at a deeper level during the TBL weeks than in the other weeks of the PBL-based curriculum.

Conclusion: Based on the success of the initial pilot study, a similar PBL-TBL study will be expanded to an entire eight-week block this coming academic year, with the goal of eventually expanding this format to cover most of Year 2 of the medical curriculum.

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119: Team Based Implementation: Lessons Learned from Year One

Mary P. King, PhD, RN, CPNP-PC, The University of Texas at Austin, School of Nursing

Background: Team Based Learning (TBL) was selected as the ideal strategy for teaching advanced health and developmental assessment to graduate neonatal and pediatric nursing students. Implementation of TBL was supported by fellow faculty, the Director of the Program and the Division Chair.

Description: Course development and implementation followed the fundamental principles and practices of TBL as outlined by Michaelsen and Sweet (2008). A backward design was used to revise course content and develop application exercises. A TBL expert was present during the first class to ensure veracity of the explanation of the TBL process. An outside education expert conducted two focus groups with the students at week six and again at week 14. Students completed two anonymous surveys during the course. Fellow faculty, the Director, and the Division Chair evaluated the class process. Readiness assurance tests and course exams were critiqued by a testing expert. Adaptations were made from week to week throughout the course.

Lessons Learned: Implementation of TBL is a process as well as an instructional strategy. Communication for understanding with fellow fac-

ulty is crucial and demonstrates the team process to students. Plan the course and individual classes early, document suggestions and criticisms immediately after every class, change to meet student learning needs. Assign relevant readings with focus study questions, design Individual Readiness Assurance Tests (IRATs) to assess key concepts, discuss the Group Readiness Assurance Tests (GRATs) immediately and clarify any misconceptions, give immediate feedback with appeals, use variety in the design of application exercises, and always capitalize on the knowledge and skills of the students. The classroom size must accommodate students and their back packs, have enough personal space for students, space for faculty to walk between groups, and enough electrical outlets to use computers. Design the first IRAT/GRAT to discuss the syllabus and course expectations, while demonstrating the TBL process. Be available to students before and after class, in addition to office hours to support students' transition to a new style of learning.

Conclusion: In order to implement TBL, one must be willing to be vulnerable, curb defensiveness, relish the topic, ensure the "4 S's" (significant problem, same problem, specific choice, and simultaneous report) for every application exercises, and enjoy being part of the academic journey with your students. It is a challenging experience and I cannot go back—TBL revitalized my life as an instructor.

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120: Wicked or Wise? The Trials, Tribulations and Triumphs of Extended Team-Projects in TBL Using Wikis

Sarah J. Mahler, Florida International University Department of Global and Sociocultural Studies

Background To date, "orthodox" TBL discourages assignments involving team-based projects exceeding a class period because they can undermine the team esprit de corps engendered through the Readiness Assurance Process and in-class content application exercises in teams (the 4 S's). The operating wisdom is that such longer-term projects provoke team dissention leading to resentments when Type A students do more than their share and Slackers come out of the TBL woodwork. But in "real life" teams typically must work collaboratively on projects that cannot be accomplished in the equivalent of one class period let alone one semester. This begs the question, then, of whether or not TBL environments can successfully require student teams to work on projects that involve several weeks' work and yet do not cause the teams to devolve into squabbling "groups." If so, how?

Description This poster documents how a brand new Global Learning course (a new undergraduate requirement at FIU) involving 15 teams of first-semester freshmen at Florida International University (120 students overall) experimented with team-based research projects using wikis. The wikis permit asynchronous outside-of-class and non-face-to-face student input into projects where student effort is chronicled through the wiki itself and thus permits both team and individual assessments. During the wiki assignment, much class time is allocated to in-class team coordination but not to actually working on the wiki, work done outside of class.

Outcome Each student team produced two wikis. The first was on a historical figure and was common to all the teams but teams could not see each other's wikis until after they were finished. At that point, teams viewed and evaluated the wikis of two other teams. Then, using the skills they had acquired and the comparisons to other teams work, each team produced a new unique wiki on a different historical figure. All wikis were evaluated using a special rubric that was publicized to the students beforehand and was consistent with rubrics used throughout the course. Vast improvement in the quality of the wikis—both in terms of historical research as well as in visual appeal—was evidenced in almost all the wikis. Additionally, students gained real-life skills designing the wikis with web, digital photo, and digital design features.

Conclusion TBL courses can use assignments which stretch beyond a class and require student coordination. We recommend use of wikis for this purpose since students can work on them asynchronously outside of class and easily know who did what and when. Class time should be set aside for teams to coordinate their efforts; not to do the wiki work but to assess their progress, check in with students' plans, keep the team members accountable, and receive guidance from faculty. In short and as with all TBL assignments, it is important to plan carefully.

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121: Development and Psychometric Testing of a Team-Based Learning Instrument

Heidi A. Mennenga, PhD, RN

Aim: This paper is a report of the development and psychometric testing of the "Team-Based Learning Student Assessment Instrument."

Background: Team-based learning is an innovative teaching strategy which offers educators a structured, student-centered learning environment (Fink & Parmelee, 2008). Although research related to team-

based learning has been conducted in a variety of disciplines, a major barrier to researchers is the lack of available instruments for team-based learning.

Method: Instrument development consisted of concept clarification, item development, and psychometric testing. The initial 45 items were developed based on a review of the literature. Four content experts established a content validity index of 0.85. Based on comments from the experts and the content validity index, the instrument was reduced to 39 items.

Results: Data was collected from 396 nursing students at one southwestern university who were taking a course using team-based learning. Principal axis factoring using varimax rotation was conducted on each of the three subscale as well as the total instrument. Psychometric testing resulted in a revised 33-item instrument that demonstrated an overall Cronbach's alpha of 0.94. The three subscales yielded Cronbach's alphas between 0.78 and 0.94.

Conclusions: Results indicated that the newly developed "Team-Based Learning Student Assessment Instrument" did accurately measure the three subscales. Based on the factor analysis, six items were eliminated, creating a final 33-item instrument. The results of the psychometric testing of this instrument suggest it to be a valid and reliable tool.

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122: Team-Based-Learning In A First Year Medical Genetics Course

A. Paula Monaghan-Nichols, University of Pittsburgh School of Medicine, 3510 Fifth Avenue, Pittsburgh, PA 15261.

Objectives: Introduce Team-Based-Learning (TBL) into a first year Medical Genetics course at the University of Pittsburgh School of Medicine. Evaluate the impact of TBL sessions on medical student performance.

Method and Conclusion: Six TBL learning modules were introduced into the 4-week Human Genetics course in the first semester of Medical School. The class of 150 students consisted of 22 groups of 6-7 students. These modules replaced 19 lectures, 3 problem based learning sessions and 5 workshops. Each TBL module lasted 3 hours and consisted of a 1 hour RAT/GRAT and a 2 hour application period. Each module was focused on important genetics concepts including molecular genetic screening, chromosomal abnormalities and cytogenetics, population ge-

netics and association studies, cancer genetics and counseling. A basic scientist and clinician were present at each session and acted as moderators. The RAT was designed to cover basic scientific concepts and consisted of 10-14 questions. The applications presented genetic problems in clinical settings. Reading assignments were given a week in advance and consisted of either a book chapter, clinical web site research or a web base information site to read. Students were graded on their performance in the RAT/GRAT but not for the application. The TBL constituted 40% of their final grade. While the overall final grades were not statistically different from previous years' courses, exam questions were more difficult and probed more in depth knowledge of genetics concepts than in previous years. The results of student evaluations suggested that they highly preferred the self-learning features of the TBL and the continuous assessment of their knowledge of genetics. As a result of the success of the Genetics course TBL, additional TBLs will be introduced into the Cell Biology, Histology and Introduction to Pathology course offered to first year medical students.

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123: Action-Based Questions for Team-Based Learning in Medical Education: A Method to Assess Students' Analytic and Synthetic Reasoning

Karen Kirkham, M.D., and Stuart Nelson, Ph.D., Wright State University Boonshoft School of Medicine, Dayton, OH

BACKGROUND: Action-based questions (ABQ) have been piloted in Team-Based Learning (TBL) application exercises at the Wright State University Boonshoft School of Medicine. Many of our TBL application exercises have been designed using multiple choice questions inserted at strategic points in an unfolding medical case. Some of these multiple choice questions require teams of 5-6 students to analyze, justify, and/or predict what a reasonable physician would do at a particular point in the clinical case; thus they are called ABQ. These ABQ challenge students to choose an appropriate course of action and generate lively discussion in TBL application exercises. Because of the effectiveness of ABQ, we decided to develop an independent set of ABQ for TBL application exercises.

DESCRIPTION: This medical educational resource consists of 40 multiple choice questions that are all designed as individual "stand-alone" ABQ. Ten human body systems are assessed (4 ABQ per system): cardiovascular, respiratory, renal/urinary tract, neurologic, gastrointestinal/liver/pancreas, endocrine, reproductive, hematologic, musculoskeletal, and skin/eye/ear. Each ABQ stem is a clinical case vignette followed by

the phrase, “What would be an appropriate course of action at this point in the case?” ABQ require multi-step reasoning to arrive at the best answers. Thus, the types of questions in this resource ask students to choose the most reasonable course of action, rather than most correct interpretation of facts.

APPROPRIATE USE OF ACTION-BASED QUESTIONS: We recommend that a 1 hour TBL application exercise consist of three to four ABQ that focus on a specific body system, e.g. cardiovascular. TBL application exercises utilizing these ABQ are appropriate for pathology courses, classes that introduce clinical medicine to 2nd year medical students, systems-based curricula, and clinical clerkships. Our experience reveals that individuals find ABQ quite challenging, but teams of medical students are able to pool their collective wisdom to arrive at legitimate consensus choices.

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124: Continuous Formative Assessment of Team-Based Learning: RATs, BATs, and CATs

William Ofstad, PharmD, Xiaodong Feng, PhD, Brad Brazill, PharmD, Maureen Lloy, PharmD, Grant Lackey, PharmD, Parto Khansari, PhD, Leanne Coyne, PhD, Sonya Frausto, PharmD, Deepti Vyas, PharmD, and David Hawkins, PharmD, California Northstate College of Pharmacy, Rancho Cordova, California

Background: Team-Based Learning (TBL) is a small group, active learning instructional strategy adopted as an alternative to traditional classroom lecture. Originally developed over 30 years ago by Dr. Larry Michelson for his business courses at the University of Oklahoma, TBL is now a leading pedagogy embraced by instructors across many disciplines and applied in classrooms around the world. Traditional TBL relies on and encourages significant self study by students prior to beginning a new course topic and entering the classroom. Self study is followed by an in-class individual and then team readiness assurance test (IRAT and TRAT). This process allows the majority of class time to move away from the lecture and instead focuses students on the application of key concepts, with individual and team-based application tests or tasks (IBATs and TBATs).

Description: California Northstate College of Pharmacy is the first school of pharmacy to fully adopt TBL across the curriculum. Based on student performance data and compiled student feedback, our faculty discovered that students often struggled with conceptually challenging, high content TBL courses. In these courses, new topics were introduced

every one to two instructional days, with summative assessment of these topics lagging three to six weeks after the classroom applications were completed. To provide students and instructors continuous formative assessment and feedback, a modified model for TBL was introduced into these high content TBL courses to add periodic checkpoint assessments following every few TBL modules, typically following every 10 to 20 hours of class time. These checkpoints, coined individual and team cumulative assessment tests (ICATs and TCATs), were intended to reinforce recently introduced course concepts and report on student learning progress prior to midterms, finals, and final projects.

Evaluation: Following implementation, performance scores and student feedback demonstrated that this modified TBL model improved student learning and retention, particularly in the timeframe following classroom applications and continuing through midterms and finals. CATs encouraged students to organize and consolidate their learning achieved through self study and classroom application while the concepts were still fresh. CATs also provided an early snapshot of student understanding of key concepts across multiple topics, which complimented the topic-focused assessment from RATs and BATs. Analysis of the annual milestone exam also documented improved retention of major course concepts following the addition of the CATs. This modified TBL model also allowed for earlier identification and remediation of students who were at risk of falling behind or failing the course. Moreover, our students preferred the modified TBL over the traditional TBL format.

Conclusion: Adoption of CATs in the classroom along with RATs and BATs is a simple modification to provide the active learning and critical formative assessment students and instructors need to optimize learning in challenging high content courses.

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125: Industry Educators' Perceptions of Student Outcomes arising from Team-Based Learning

Elizabeth Oldland Grad Dip Adv Nsg, David Glanville MN, Julie Considine PhD, Judy Currey PhD, Faculty of Health, Medicine, Nursing and Behavioural Sciences, Deakin University, Melbourne, Australia

The increased acuity and shorter stays of critically ill patients combined with fewer qualified specialist critical care nurses has meant that post-graduate critical care nursing programs need educational strategies to accelerate students' acquisition of critical thinking and problem solving skills. In 2009, findings of a pilot study that included 12 hours of TBL in one semester showed student acquisition of knowledge, skills and atti-

tudes required for specialty critical care practice was accelerated. These postgraduate programs are conducted in a collaborative model whereby students are paid by hospitals to work 3 days per week for the year to gain clinical experience and attend university for theoretical course content. Assessments of clinical practice based on professional competencies (Australian College of Critical Care Nurses' Competency Standards for Specialist Critical Care Nurses) are conducted by hospital nurse educators. The aim of this study was to evaluate clinical educators' perceptions of students' clinical performances as a consequence of TBL in the academic program.

An exploratory descriptive study was conducted using an open-ended questionnaire to elicit clinical educator's perceptions and experiences of students' clinical performances following the inclusion of TBL. Eight educators responded to the questionnaire; four were subsequently interviewed and filmed to explore emergent themes. A thematic analysis revealed clinical educators perceived TBL increased students' capacity to critically analyse concepts and challenge current practice, increased students' willingness to assist less experienced staff, assisted students to rationalise nursing care, and increased students' willingness and capacity to advocate for patients within the multidisciplinary team. Educators also received less requests for clinical tutorials of equipment and critical practice issues. Student's psychomotor skill acquisition remained unchanged.

These preliminary findings suggest that TBL is a valuable strategy in assisting postgraduate nurses to master discipline-specific professional competencies. Clinical educators were supportive of the introduction of TBL due to students' accelerated acquisition of critical thinking, problem solving and advocacy skills.

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126: Introductory Human Genetics Course for Medical Students: Comparison of a Traditional Lecture-Based and a Team-Based Learning (TBL) Format

M. Olivier, Ph.D., D. Basel, M.D., D.J. Sidjanin, Ph.D., Karen Marcdante, M.D., Medical College of Wisconsin, Milwaukee, WI

Background: The Medical College is undergoing medical student curriculum revitalization moving from a discipline centered, lecture-based format to an integrated organ system approach using TBL. Within the traditional curriculum, medical genetics is a 3-week course at the beginning of the first semester of the first year (M1) combining general introduction to DNA and transcription/translation (week 1) with human dis-

ease genetics (Mendelian genetics, complex disease genetics, linkage and association (week 2). During week 3, gametogenesis, fertilization, and early embryonic development are addressed. As genetics is not an “organ system”, the need to reframe genetics within an integrated TBL curriculum presents the opportunity for formative and summative evaluation comparisons of curriculum models and outcomes.

Description: For the 2010/11 school year, 28 students randomly selected from a pool of volunteers, are participating in our organ-systems based Pilot Integrated Curriculum (PIC) while the remainder of the class (176 students) are enrolled in the traditional curriculum. Students in the PIC participate in 3 half-day TBL sessions as part of a General Principles Module in week 2 of their first semester, designed to cover the material from week 2 of the traditional Medical Genetics course. Traditional lecture materials in the Medical Genetics course were converted into application tasks in the PIC TBL sessions, and structured to enhance learning and application of genetics in the clinical context. Students were assessed in each curriculum using traditional multiple choice examination questions, and instructor evaluations for teachers in both lecture- and TBL format were gathered.

Evaluation: Overall, our initial assessments demonstrate that medical genetics can be successfully and effectively taught using a TBL approach. Instructor evaluations highlight the advantages for PIC-TBL curriculum: instructors can monitor and correct student learning gaps and prompt students to apply genetics within clinical scenarios, enriching students’ knowledge.

Conclusion: Student learning and instructor response has been very positive, suggesting that the conversion of the curriculum to a TBL-based instruction may have beneficial impacts not only on learning but on satisfaction as well.

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127: A Comparison of Team-based Learning with Traditional Tutorial System

Sylvester Oppong, MB ChB, PhD, MBA; Benjamin Larweh, BA; MA

Background: The University of Ghana Medical School has since its inception in 1963 used traditional didactic lectures augmented by a tutorial system to teach students at the preclinical level. The tutorial system is an interactive way of deepening the knowledge of students with a focus on assisting them to apply theoretical knowledge to practical and clinical situations. Even though the tutorial system has been used for

several years, recent observations have called its effectiveness into question. These observations include a lack of preparedness by students, increasing lack of students' interest making the sessions progressively shorter as well as persistent non-participation of some students. Additionally, recent increases in class sizes have resulted in larger tutorial groups with a consequent reduction in the level of interaction. Tutorial sessions have thus in most cases been turned into mini didactic lectures with very little interaction. It has therefore become necessary to try out some more interactive teaching methods.

Description: A team-based learning (TBL) session in Nutrition was organized for third year pre-clinical students who had hitherto only been exposed to didactic lectures and traditional tutorials. The class of 140 was divided into two and each group further divided into smaller groups of 8 students. The Readiness Assurance Process (RAP) consisted of 15 multiple choice questions administered with books closed for both individual and team work. The application part had 5 True/False stems with 5 questions per stem and was administered as an open book session. In the absence of score cards, students' answers were tabulated on a white board. Instant feedback was given by the facilitators. The session lasted for two hours. A survey on students' feedback was performed using a semi-structured questionnaire.

Results: Majority of students thought TBL was significantly better and more interesting than the traditional tutorial system, attributing the high level of interest and higher cognitive knowledge gained mainly to the group discussions. Unlike traditional tutorial system, a significant number of students prepared adequately before the TBL largely to enable them contribute to group discussions. Most students found the TBL very beneficial and thus recommended a replacement of the traditional tutorial system with TBL.

Conclusion: As a result of the substantial endorsement of TBL by students, the University of Ghana Medical School is seriously considering replacing its traditional tutorial system with TBL in a phased manner.

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128: Five Years of Improved Scores Using a Modified TBL Approach for MCAT Prep Compared to a Lecture Format.

James N. Pasley, Ph.D., and Lisa Bilello, B.A., The University of Arkansas for Medical Sciences, College of Medicine, and Center for Diversity Affairs, Little Rock, Arkansas 72205

Background: Previously, a standard lecture format was used in a MCAT preparation course for economically disadvantaged students interested in medical careers. In 2006, we revised the course to use a modified team based learning format with no lectures.

Description: The revised course began with a 13-week (Saturdays only) program from January -April and was changed in 2009 to a daily program for 13 days in June to allow more students to attend. Each session begins with student presentations based on reading assignments followed by an I-RAT from a typical MCAT passage which is then repeated with the students working in teams of four (G-RAT). Medical students facilitate the discussion sessions in the physical and biological sciences and verbal reasoning sections. Each daily session concludes with a timed CBT quiz (application quiz) based on that day's topics. Participants complete a full length MCAT CBT pre-test at the beginning and a posttest at the end of the course.

Results: From 2006-2010, total scores from pre to post-tests increased an average of 7.7 points compared to pretest and posttest total scores that increased only 1 or 2 points before 2006. Actual MCAT total scores have also increased from the pre-TBL average score of 19.0 to the 2010 average total score of 29.2 in 2010 with the TBL format. These data have resulted in more students from the class gaining admission into the College of Medicine.

Conclusions: The modified TBL format appears superior to a lecture format for MCAT preparation.

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129: Psychometric Properties of the Team Performance Scale in a 3rd Year Medical School Clerkship

Jennifer M. Purcell, PhD, Albert Einstein College of Medicine

Background Research and evaluation are critical components of any educational initiative, and selecting appropriate tools to measure the construct of interest is important to ensure the reliability of data and validity of results. The purpose of this poster is two-fold: 1) review the psychometric properties of the Team Performance Scale (TPS) with third year medical students, and 2) apply the scale to determine if student ratings of team processes vary based on individual scores on readiness assurance tests (RAT).

Description The Department of Family and Social Medicine recently introduced four team-based learning (TBL) sessions to its clerkship cur-

riculum. As part of a comprehensive curriculum evaluation process, faculty are collecting data from multiple sources to measure knowledge, higher-order thinking, and quality of team performance. In measuring the latter, there was a concern that individual preparation and performance might impact the ratings of team processes.

To determine if this is the case, students were asked to complete the TPS, developed by Thompson and colleagues (2009), as part of their end-of-rotation clerkship evaluation. Using a similar method described in the Thompson et al article, we examined the internal consistency, proportion of explained item variance, and ability to distinguish among teams. Finally, we calculated the difference between individual RAT and group RAT scores and correlated these with the total TPS score for each student.

Results Preliminary results using data from five rotations ($n = 74$) show similar psychometric properties for the TPS as presented by the scale's authors. These results support our selection of the TPS to measure teamwork as part of the TBL curriculum. Additionally, individual differences in readiness assurance test scores were not significantly correlated with TPS scores.

Conclusions There is evidence of reliability and validity when using the TPS with a group of 3rd year medical students. Additionally, individual preparation for the TBL experience may not be a confounding variable in future research evaluating the impact of team performance on learning in the health professions.

Note. Results presented in the proposed poster will be based on two additional data collection cycles.

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130: Evaluation of the Team-Based Learning Curriculum in a Family Medicine Clerkship

Jennifer M. Purcell, PhD, Pablo Joo, MD, Albert Einstein College of Medicine

Background The use of team-based learning (TBL) in medical education has grown steadily over the past decade. However, its effectiveness in clinical clerkships has been reported in only a few articles. This poster will present evaluation data from the first eight months of the new TBL curriculum in a Family Medicine clerkship. It will include a brief description of the curricular redesign, results of quantitative outcome data, and next steps in evaluation.

Description After completing a six-month iterative design process, the Department of Family and Social Medicine implemented a series of TBL sessions in its third year clerkship. Four 2-hour sessions replaced one standard health promotion lecture and three case-based sessions covering asthma, hypertension and hyperlipidemia, and diabetes. Students complete online modules during Phase 1. The second phase is comprised of the standard IRAT, GRAT, and faculty feedback process, and activities in Phase 3 vary based on the specific topic. Data from multiple measures are being collected to evaluate the curriculum. These include the team performance scale, student and faculty feedback, observations by the department's education specialist, and differences in IRAT and GRAT scores. Exam scores (20 items) of students in TBL will be compared with students who participated in the lecture and case-based sessions the previous year. Additionally, responses to four self-report survey items on knowledge change, student interaction, and the opportunity to apply content to clinical questions will be compared.

Results Exam scores and self-report survey responses from 120 students over 8 rotations (June 2010 through January 2011) will be compared with 119 students from the first 8 rotations of last academic year (June 2009 through January 2010). Descriptive and inferential statistics will be presented for each of the four topic areas. Initial analyses using 6 rotations show no significant differences in exam scores and GRAT scores were higher than IRAT scores in 97.6% of cases. Results of self-report comparisons are pending. Although qualitative analysis is an integral part of the evaluation process, results of faculty and student feedback will be will not be reported here.

Conclusions Curriculum evaluation is an ongoing process and is especially important when implementing any curricular change. Preliminary results support the use of the TBL in the family medicine clerkship. Measures of student satisfaction, team performance, and faculty feedback will be reviewed to create a more complete and robust evaluation.

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131: Do Students Find Patient Encounter Videos to Be a Useful Tool in Team-Based Learning?

Brenda Roman, MD and Andrew Smith, MD, Boonshoft School of Medicine, Wright State University, Dayton, Ohio, USA

Background: Team-Based Learning™ (TBL) has been shown to be a favorable experience by participants and increases the active engagement of the learner compared to traditional lectures^{1,2,3}. The use of

video clips as teaching aids have been shown to be beneficial in a lecture setting by stimulating classroom attendance and helping students apply theory to simulated practice⁴. While there are studies demonstrating the use of video in other medical applications there is limited data on the use of video as an application stimulus for TBL.

Methods: Second-year medical students at the Boonshoft School of Medicine (N=93) participated in a TBL exercise designed to teach mood disorders during their psychopathology course. The individual and group readiness assurance tests were based on traditional reading assignments and web-based tutorials. For the application exercise component of the module, students were presented with two different patient encounter video clips, each showing a mental health provider interviewing an actual patient—one with depression and one with mania. Application exercise questions required students to describe their observations of the patients with mental status exam findings and discuss diagnoses and treatment. Following the completion of the psychopathology course, students were asked to complete an online evaluation of five questions on a modified 5-point Likert scale.

Results: 93% of the students completed the survey. Students found the use of video clips in TBLs to be enjoyable (4.78/5), useful to encourage discussion (4.47/5), and useful in presenting mental illness (4.71/5). Most agreed that they would like to see more videos used in TBLs in the future (4.36/5).

Conclusions: Based on our findings, students appear to find value in the use of videos in the setting of active learning as they felt these clips encouraged discussion in their teams and they wanted to see them used more in the future.

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132: Team Based Learning to Prepare Second Year Medical Students for the Pulmonary/Critical Care Rotation

Robert Shaw Md, Harry Adams, Md

Background: When rounding in the Intensive Care Units, third and fourth year medical students are surprised by the collaboration between respiratory therapy, nursing, pharmacology, pastoral care, and physicians. The students remember basic facts about respiratory failure, sepsis, acute kidney injury, and ethical issues relating to continuing life sustaining treatments. They have difficulty; however, integrating those complex issues and taking a multidisciplinary approach to patient care. We sought to initiate Team Based Learning (TBL) into the second year pulmonary section of the Introduction to Medicine Course in hopes of reinforcing basic knowledge, but more importantly to show the students how important collaboration with other health care providers is in taking care of critically ill patients.

Description: Our institution delivers almost all instruction in Internal Medicine to second year students through lecture format involving PowerPoint presentations given by many different physicians. The students can see the slides on line, and attendance at lectures is not mandatory. Lecture attendance is sometimes poor. The students also have 15 small group sessions during the year in which they work through a patient scenario with a mentor, who guides them through the process of making a diagnosis and understanding pathophysiology. In the small group session, students ask questions but do not really collaborate in arriving at a diagnosis. The intervention, which was made, was to replace a small group session with a TBL exercise. We wanted to see the impact of this on student collaboration, which as mentioned above is important in Critical Care Medicine.

Results: All 72 students responded to a questionnaire using a Likert scale 1-5 (1 strongly disagree, 3 neutral, to 5 strongly agree). The results (average Likert scale) are as follows:

TBL is an effective way to learn basic facts	4.1
TBL is an effective way to apply basic facts	4.2
Group functioned well	4.8
Preparing for IRAT was worthwhile	4.1
Learned more doing questions as a group than on my own	3.7
TBL should be used more	3.5
TBL helped me learn the value of collaboration in clinical medicine	4.1

The students were critical of Peer Review. Some were critical of the grading method used. To paraphrase the comment of one student, "TBL was the most beneficial experience I have had in medical school. This works wonders for me. Even though I cannot stand being in a room with 80 people, and do not find that environment conducive to my learning, I still found great benefit".

Conclusion: Second year medical students gave a positive response to the use of TBL in learning the value of collaboration in clinical medicine. We intend to broaden the TBL experience in teaching clinical medicine, and make it a part of the training of pulmonary/critical care fellows.

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133: TEAM-BASED LEARNING IN A QUANTITATIVE SOCIOLOGICAL RESEARCH METHODS COURSE

Ryan Sheppard, Assistant Professor of Sociology, St. Olaf College

Background: In our Sociology/Anthropology department, all majors are required to take a course in quantitative research methods. Although students have taken a statistics course as a prerequisite, they often approach the quantitative methods course with concerns and anxieties about their abilities to design quantitative research and do statistical analysis. Since 2007, I have addressed this by including some but not all aspects of TBL in the course.

Description: The course includes the following elements of TBL: Team placements based on equitable assets, Readiness Assessment Process (five times), application exercises, simultaneous reporting, gallery walks, and peer evaluations. Each team also designs a portion of a survey questionnaire, gathers and analyzes data from several hundred students, and reports results in written and oral forms, including a public poster session on campus, and many of the students go on to present their research at professional conferences. I examine outcome data, including students' exam scores and end-of-course evaluations, focusing on data from 2010 and comparing this with data from two other TBL years (2008 and 2009) and one non-TBL year (2006).

Conclusion: The TBL approach is effective in this course. It helps students bond as teams and it fosters student gains in transferable skills and in knowledge and skills in quantitative research. Although students express some frustrations with working in teams, they affirm the value of the experience and its usefulness in preparing them for group work in post-college careers.

134: A Course in Medical Statistics: Comparing Team-Based Learning Strategies with Traditional Methods

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Background: At Duke University School of Medicine, third-year medical students suspend their clinical training and carry out research with a mentor for a year, either at Duke or at other institutions. At the end of the year, they analyze the data collected for their project and write a thesis on their research. The medical statistics course is offered at the beginning of the third year to prepare the students for the analysis they will perform later. The traditional teaching method using lectures, homework, and exams was used several times without rousing success to teach statistics to the students. In 2010, we revised the course to use the team-based learning (TBL) approach for students based in Durham for the year. Students who did their third-year research at other institutions (in the US and abroad) used the video-recorded lectures from the previous year and the on-line exams.

Description: Two cohorts of students completed the medical statistics course in 2010: a cohort of 30 students completed it in person using TBL, and a cohort of 15 completed the course online and took web-based exams. The TBL cohort read the PowerPoints and/or watched the streaming videos from last year's lecture-based course as preparation for the TBL sessions. The other cohort also read the PowerPoints and/or watched the streaming videos from last year's class in preparation for the four web-based exams. These were the same exams that were administered last year. For the 2010 TBL cohort, last year's exams were modified to create the readiness assessments and group application exercises.

The TBL class meets for 2.5 hours 2-3 times per week for 4 weeks for a total of 9 TBL sessions. Each session includes an IRAT, GRAT, and Group Application Exercises. The group application exercises consist of 7-10 problems that involve more thought and sometimes require analysis of data using JMP software. Scores on all of these activities are the basis for the students' grade in the course. The online course consists of 9 sets of PowerPoints/streaming videos and 4 exams.

Evaluation: This presentation will discuss the challenges and the overall evaluation of the first use of TBL for medical statistics at Duke. We also will compare Durham-based students' performance on the IRAT, GRAT, and activity in the TBL course to the non-resident students' performance on similar questions on the web-based exams for 2010 and in

previous years. We will provide an overview of the lessons learned and the improvements planned for the fall 2011.

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135: An Active Multidisciplinary Approach to Teaching Drug Information and Literature Evaluation Skills

Miki Goldwire PharmD, Rebecca Moote PharmD, Jason M. Brunner PhD, Allana Sucher PharmD, Lauren Burt PharmD

Background: Regis University School of Pharmacy (SOP) is uniquely positioned within pharmacy education because the school has adopted team-based learning (TBL) as the primary method of instruction. Furthermore, drug information and literature evaluation skills are reinforced in multiple courses throughout the integrated curriculum, which is based on multidisciplinary faculty support.

Description: The goals of our multidisciplinary teaching approach for drug information and literature evaluation in a TBL format are to improve students' ability and confidence in performing drug information and literature evaluation skills in the Integrated Literature Evaluation course and secondly, to provide students with the opportunity to use drug information skills throughout the curriculum. Our long-term goal is for students to be able to better retain such information in later semesters and to develop life-long learning skills. Student knowledge will be evaluated through an individual score and a team score. The individual score is based on individual readiness assessment tests (iRATs), drug information questions, a midterm exam, and a cumulative final exam and the team score is based on team readiness assessment tests (tRATs) and application exercises. Student knowledge will be considered met if the average individual and team score is >70%. Student confidence, satisfaction, and course effectiveness will be assessed by a survey.

Results: Student knowledge will be assessed in December (at the end of the semester) by course grades. Course effectiveness and student satisfaction will be assessed by a survey. The survey will also assess the perceived value of RATs, application exercises, and overall course format in enhancing students' confidence in their ability to perform drug information and literature evaluation skills in general and as required in other courses.

Conclusion: As a result of a multidisciplinary, integrated TBL curriculum, we hope to improve students' confidence and ability in drug information and literature evaluation skills.

136: The Effect of Gender and Group Size on Peer Assessment in Team-Based Learning

Mark H Townsend, MD, MS, Louisiana State University Health Sciences Center New Orleans

Background: Team-based Learning (TBL) is increasingly used in medical education. As a teaching method, TBL inherently addresses the twin demands of medical student education. Depending on setting, and with similarly ill individuals, physicians must be trained not only use medical knowledge independently of others, but also be expected to perform complimentary functions within multi-professional groups. Peer feedback given in TBL is an important tool for socialization, as students not only model shared responsibility for major tasks, but also must be individually accountable for presenting key information to the group.

Description: We examined peer feedback forms for all four, six-week psychiatry clerkship courses in the fall semester of 2010. The feedback form we employed is widely used, and consists of 12 Likert-like scales in three domains: cooperative learning skills, self-directed learning, and interpersonal skills. We assigned a score of 100 to students who were given perfect marks in all domains by peers. Per TBL convention, students were assigned randomly to their groups at the start of each course.

Results: Seventy-eight students completed the four courses. Among them, two groups consisted of four students; nine of five; three of six; and one group had seven students. We observed a non-significant distribution pattern in which groups with the modal five students reported the most positive peer feedback: 92.4%, vs. 89.7% for four-student groups, 88.0% for six, and 80.3 for seven. A great deal of variability existed among the four sequential classes or blocks ($X^2=40.5$, $df=9$, $p<01$): Block 1A, 89.7%; Block 1B, 95.0%; Block 2A, 82.8%; Block 2B, 91.9%. Interestingly, gender balance was a strong predictor of positive self-assessment. Groups that contained near-equal male to female ratios rated themselves more positively than those that did not (92.8% vs. 87.7%, $t=1.54$, $p=0.08$). Further, the class with the lowest peer assessment scores (82.8%) had the widest gender variability among its three groups.

Conclusions: Peer self-assessment was surprisingly variable and, as suggested by these four classes, influenced by a group's size and gender composition. If a group's male to female ratio is a proxy for randomization, these results are consistent with existing literature. Further, data suggesting that mid-sized groups are optimal group size for peer self-regard are tentative and must be examined further.

137: Curricular Design from the Bottom Up: Development of a Novel Modified Block-Style Curriculum Using Backward Design

Rajesh Vadlapatla PhD, Diane Pacitti PhD, RPh, The Saint Joseph College School of Pharmacy, Hartford, CT

Background: The Saint Joseph College School of Pharmacy has adopted a three calendar-year modified block style curriculum. The majority of the courses throughout the first two years of this new PharmD program have been designed using the “backward design” method of curricular development, first proposed by Wiggins and McTighe in 1998.

Description: In the modified block style curriculum model, the students study one course (block) at a time, intensively, from beginning to end. Since the modified block style curriculum is at rigorous pace, we will be forming small learning groups facilitate the andragogical model. Mastery of the course content is achieved by employing topic-appropriate active learning techniques, such as problem sets, case studies, etc. in these small groups.

In the backward design model, the curriculum is designed by beginning with the end result in mind. In our program, curricular planning begins with specific learning and assessment outcomes. These outcomes are mapped to school wide ability based outcomes (ABOs), National Association of Boards of Pharmacy (NABP) and other professional standards. Course content and topics are designed with the intention of successfully meeting these goals and objectives. The next step in the backward curricular design method is to determine appropriate assessment techniques. Student understanding of the course content is closely monitored by formal and informal assessments during the progression of a block (course). Assessments may include daily formative quizzes and biweekly summative evaluation examinations, as well as informal assessments such as assignments, quizzes, and student presentations. This assessment plan will gather continual evidence of mastery of the content. The final step in the backward design method of the curricular development is to prepare learning experiences and instruction. This includes writing lesson plans, designing small group learning and teaching activities, reading lists and lectures.

Results: A curricular model is only deemed successful with evidence of student mastery of course material. The effectiveness of the backward design method in our curriculum will be determined using student and faculty evaluations. In the Saint Joseph College School of Pharmacy model, each of the educational outcomes has been mapped to the professional standards discussed above.

Conclusions: The backward design method was used in the development of our modified block style curriculum. We are confident that this will not only lead our students to master curricular content, but to develop critical thinking skills which are invaluable tools for life-long learning.

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138: Student Perceptions of Learning in Team Based Classes Using Tools from Social Psychology and Management to Assist Team Development

Carolyn Whitney, Ph.D.

Background: Often undergraduate students are assigned to work in teams for either short-term or semester-long projects but with little or no guidance about how to develop an effective team. It is often assumed that teams will just find their way and overall outcomes will be achieved. Unfortunately, if one first asks students how many bad experiences they have had completing team or group projects for academic assignments, the number of hands that go up and the degree of negativity in their expressions suggests that just about all students have had at least one if not several experiences with teams and group work that did not go well for any number of reasons. If one then asks a follow-up question as to how many students would prefer group and team work assignments for the current course in which they are enrolled, many will indicate a very specific preference for working individually over working in teams or groups while completing course assignments. But will attitudes and perceptions toward teamwork and team assignments be better if students are first instructed on key aspects of team building and techniques to decrease the occurrence of social loafing and poor performing team mates?

Description: For several years I have been implementing team based learning opportunities within my psychology courses and recently I began teaching Organizational Management and Behavior within the Business Department and employed similar team based learning opportunities in that class as well. Team based learning in the Psychology courses seems to occur much less frequently while in the Business department, team based learning opportunities occur with much greater frequency. I decided to seek feedback from students in both courses at the end of the semester regarding whether individual or team based learning opportunities during the semester provided valuable opportunities for learning the material and content of the courses. I also asked whether students thought such team based learning opportunities should be included in future offerings of the courses. Students in both courses were assigned to a team during the first week of the semester. As it was the

first and second day of the course, most students did not know their team members at all. Initial team assignments involved each team coming up with their own name, a mission statement or purpose to which their team was committed, as well as a team member performance rubric. The rubrics were each unique to each team and identified behaviors that they wanted to see in their own and their team member performances all of which focused on positive interactions between team members and behaviors associated with strong academic performances. Rubrics were to be completed each time team members met or interacted as a team including out of class assignments and in-class team case analyses.

Results: There were a total of 42 Social Psychology students and 23 Organizational Management and Behavior students who were asked to provide anonymous feedback about the course for the purposes of my better understanding what worked well for them in regard to their learning of the assigned material. The overwhelming majority of students indicated that the team based work in the courses, both during and outside of class, motivated them to learn the material better and also provided many opportunities to hear other perspectives and applications of material to real world situations. Several comments from students indicated that completing the performance rubrics each time was more of a chore and a burden as their teams were performing so well together that there was no need to evaluate their performance each time they completed work together. Nearly everyone indicated positive experiences in their teams and overwhelmingly suggested that the team based learning opportunities were very helpful to their learning of the material as well as being fun opportunities for learning.

Conclusion: Team based learning opportunities often fail to be perceived as positive experiences by undergraduate learners but by providing only basic training in how to set up a team for a positive experience together it would appear that learning outcomes and student perceptions of group and team work are significantly enhanced.

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139: Team-Based Learning and Class Attendance in Nonmajors Biology

Dianne York, MS, MT(ASCP)

Background: Introductory biology courses are often taken by undergraduate students as part of a general education requirement. Teaching science to nonmajors students can be challenging, however, as these students often lack enthusiasm for the subject matter. Lack of interest

can lead to poor class attendance, and relatedly to poor grades. The Team-Based Learning (TBL) teaching strategy provides a supportive environment for students to work together and help each other learn. Importantly, students become accountable to their teammates to attend class and to prepare for the scheduled learning activities.

Description: At Lincoln University of Pennsylvania, a 15-week human biology course designed for nonscience majors is offered as an option to satisfy the general education requirement in science. The course typically enrolls about 180 students per semester. Historically, the course had been taught using traditional lectures. In 2009, TBL was implemented as part of a series of course design modifications, seeking to enhance student learning. To assess the impact of the transition from lecture-based teaching (2007 and 2008) to TBL (2009 and 2010), a review of class attendance records from 2007 through 2010 was conducted. Only students who completed the course were included.

Results: In 2007 and 2008, the percentage of students missing 0 to 1 day of class was 23% and 24%, respectively. In 2009 and 2010, with TBL, the percentage of students missing 0 to 1 day of class was 41% and 38%, respectively, a 16% improvement. Furthermore, in 2007 and 2008, the percentage of students with 4 or more absences was 54% and 48%, respectively. In 2009 and 2010, the percentage of students with 4 or more absences was 28% and 26%, respectively, a 24% decrease.

Conclusion: These results indicate that TBL is an important factor in motivating students to attend class.

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